



WALKER
RESTORATION CONSULTANTS

CITY OF LOWELL, MASSACHUSETTS
PROJECT MANUAL & SPECIFICATIONS
For
IFB16-22

LEO A. ROY & LOWER
LOCKS PARKING
GARAGE
RESTORATION
LOWELL, MA

PREPARED FOR:
CITY OF LOWELL, MA

ISSUED FOR BIDDING
AUGUST 5, 2015

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SECTION 00116
INFORMATION FOR AND INSTRUCTIONS TO BIDDERS

1. DEFINITIONS AND TERMINOLOGY

Article 1, Definitions, of the General Terms and Conditions of the Contract for Construction, Reconstruction, Installation, Demolition, Maintenance, or Repair of any City of Lowell Public Building (“General Terms and Conditions”) are incorporated by reference as if fully rewritten herein. In the event of a conflict between the within definitions and those found in the General Terms and Conditions, the former govern for the purposes of these Instructions only. All other terms which are not herein defined have their ordinary dictionary meaning.

ADDENDUM (ADDENDA, PLURAL)-An Addendum is a document issued by the City prior to the opening of the General Bids which clarifies, amends, or modifies the Bidding Documents.

ALTERNATE BID-An Alternate Bid (or An Alternate) is an amount that is either added to or deducted from the Base Bid depending on the designation on the Bid form.

BASE BID-A Base Bid is the sum proposed by a Bidder to perform the Work and does not include any Alternate Bids.

BID-A Bid is a proposal to do the Work for a specified sum and includes accompanying forms which are required to be submitted.

BIDDER-A Bidder is a person who or an entity that submits a Bid pursuant to M.G.L. c. 149, §§44E and/or F and thus includes Filed Sub-Bidders, except when specifically referred to as either General Bidder or Sub-Bidder. The pronouns “it” and “they” are used herein when referring to a Bidder or Bidders, respectively.

BIDDING DOCUMENTS-The Bidding Documents are comprised of the entire Project Manual, which includes, but is not limited to, the Invitation to Bid (advertisement), the Instructions to Bidders, all of the forms (e.g., Bid forms, sample Agreement form, bond forms), the wage rates, the General Terms and Conditions of the Contract, any supplementary terms and conditions thereto, the Plans, the Specifications, and all addenda.

BUSINESS DAYS-Business days are defined as all days of the week excluding Saturdays, Sundays, and those holidays for which the City offices are closed for observance.

FILED SUB-BID/SUB-BID-A Filed Sub-Bid, or Sub-Bid, is a Bid submitted pursuant to M.G.L. c. 149, §44F.

FILED SUB-BIDDER/SUB-BIDDER-A Filed Sub-Bidder, or Sub-Bidder, is a person who or an entity that has submitted a Sub-Bid pursuant to M.G.L. c. 149, §44F. The pronouns “it” and “they” are used herein when referring to a Filed Sub-Bidder or Filed Sub-Bidders, respectively.

GENERAL BID-A General Bid is a Bid that is submitted pursuant to M.G.L. c. 149, §§44E.

GENERAL BIDDER-A General Bidder is a person who or an entity that submits a General Bid pursuant to M.G.L. c. 149, §§44E. The pronouns “it” and “they” are used herein when referring to a General Bidder or General Bidders, respectively.

PURCHASING DEPARTMENT – The Purchasing Department refers to the City of Lowell Purchasing Department located at 375 Merrimack Street, 3rd Floor, Room 60, Lowell, MA 01852

2. COPIES OF BIDDING DOCUMENTS

A Bidder may obtain one complete (1) set of Bidding Documents for a fully refundable deposit in an amount set forth in the Invitation to Bid, if the Bidding Documents, including all addenda, are returned to the Purchasing Department in good condition within ten (10) calendar days from the date of the opening of the General Bids. The Bidder will forfeit the deposit if the Bidding Documents are not returned within this time period. Any Bidding Documents returned by mail should require a signature evidencing the date of receipt by the City. In the event of a dispute as to whether the Bidding Documents were received by the City in a timely fashion, the only document which will be accepted as proof of timely delivery is the mail carrier’s official receipt. The City is not responsible for any delays caused by the mail carrier service.

The City shall charge a Bidder a nonrefundable fee for each set obtained after the first two sets, in an amount set forth in the Invitation to Bid.

The City is not responsible for delays in mail service where a Bidder has requested that the Bidding Documents be mailed.

No partial sets of Bidding Documents will be issued.

The Contractor may retain the Bidding Documents; however, the Contractor shall request a refund of its deposit within ten (10) calendar days after the date of the opening of the General Bids or their deposit shall be forfeited.

It is the responsibility of the Bidder to insure that it has obtained a complete set of Bidding Documents. Complete sets of Bidding Documents shall be used in preparing Bids. Neither the City nor the Architect assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents in preparing the Bids.

Distribution of the Bidding Documents is for the sole purpose of obtaining Bids and does not confer a license or grant permission for any other use of the Bidding Documents.

Reference: M.G.L. c. 149, §44B(1).

3. STATE WAGE RATE REQUIREMENTS

The minimum prevailing wage rates are included with the Bidding Documents and apply to this Project.

4. CITY EMPLOYMENT REQUIREMENTS

The requirements of the Minority Business Enterprise Program and other City of Lowell Employment Plans are included with the Bidding Documents and apply to this Project.

Each Bidder must review the material provided herein carefully in order to understand the requirements that will be imposed for this Project.

5. QUESTIONS AND INTERPRETATIONS

All questions about the meaning or intent of the Bidding Documents shall be received in writing no later than the end of the business day seven calendar days before the date herein set for the opening of General Bids. Any questions received after such time will be answered at the discretion of the City. Questions may be emailed or faxed to the City of Lowell Purchasing Department located at 375 Merrimack Street, 3rd Floor, Room 60, Lowell, MA 01852

Written clarifications or interpretations will be issued by the City of Lowell Purchasing Department located at 375 Merrimack Street, 3rd Floor, Room 60, Lowell, MA 01852 in the form of an Addendum. Only questions answered by an Addendum will be binding. Oral clarifications or interpretations will be without legal effect. Addenda will either be posted electronically to the City of Lowell's Purchasing Department web site.

Each Bidder shall be responsible for determining that it has received all Addenda issued.

6. THE BID

BIDDER'S REPRESENTATIONS.

In submitting a Bid, the Bidder represents that:

- it has read and examined the Bidding Documents thoroughly;
- it understands the Bidding Documents;
- the Bid is made in accordance with the Bidding Documents; it has visited the site, has become familiar with the conditions of the site and the surrounding area, and has familiarized itself with local conditions that may in any manner affect cost, progress, or performance of the Work;
- it has correlated its own observations with the Bidding Documents;
- it has found no errors, conflicts, ambiguities, or omissions in the Bidding Documents, except for those that it has brought to the Purchasing Department's

- attention either orally at a pre-bid conference or in writing at least seven (7) calendar days prior to submitting its Bid;
- it is familiar with all of the applicable Massachusetts laws affecting its Bid, including, but not limited to, M.G.L. c. 149, §§44A-J, inclusive; M.G.L. c. 149, §§27, 27B and 29; and M.G.L. c. 30, §§39F, 39I, 39J, 39K, 39L, 39M, 39N, and 39O, is familiar with the applicable rules, procedures, and ordinances of the City, and is familiar with all applicable Federal laws, rules, and regulations and its Bid is in conformity with those laws, procedures, and ordinances; and
- the Bidder has complied with every requirement of these Instructions and that the Bidding Documents are sufficient in scope and detail to indicate and convey an understanding of all terms and conditions for the performance of the Work.

CONTENTS OF A BID.

A general Bid must include:

- a completed General Bid form;
- a Bid deposit;
- DCAM Certification and Update Statement.
- Lowell Affirmative Action Contract Requirements Contractors Certification
- Statement of Tax Compliance
- Debarment Disclosure Form

A Filed Sub-Bid must include:

- a completed filed Sub-Bid form;
- a Bid deposit
- DCAM Certification and Update Statement

Note to Filed Sub-Bidders: Every Sub-Bidder duly filing a Sub-Bid with the City shall be bound thereby to every General Bidder not excluded therein from the use thereof; and any variance from such Sub-Bid communicated to a General Bidder shall be of no effect.
Reference: M.G.L. c. 149, §§44F(3).

RIGHT TO WAIVE INFORMALITIES AND PERMIT CURATIVE MEASURES.

The City reserves the right to waive any Bid informalities. The City may permit bidders who fail to include all non-statutory, City of Lowell forms to cure such omission(s) within five days of bid opening, subject to the City's discretion.

Bid Deposits: Every Bid must be accompanied by a Bid deposit in the form of a Bid bond, certified check on, or a treasurer's or cashier's check issued by, a responsible bank or trust company, payable to the City of Lowell. The Bid bond shall be (a) in a form satisfactory to the City, (b) with a surety company qualified to do business in the Commonwealth and satisfactory to the City, and (c) conditioned upon the faithful performance by the principal of the agreements contained in the Bid. The Bid deposit shall be no less than five percent (5%) of the value of the Bid. *Reference: M.G.L. c. 149, §44B(2).*

Bids Forms. Each Bid shall be submitted on the Bid form included in the Project Manual. Bid prices must be stated in both dollar figures and words. In the case of a conflict, written amounts shall control over numbers. All blank spaces must be filled. Do not leave any blanks. Print "N/A" in any space not needed or used. The Bid form shall be completed in ink or by typewriter.

Acknowledgment of Addenda. Each Bidder is required to acknowledge the receipt of all Addenda (the numbers of which are to be filled in on the Bid form by the Bidder). The City, in its sole discretion, may deem a Bidder's failure to acknowledge any Addendum a minor informality.

SUBMISSION OF A BID.

Prior to the deadline for receipt of Bids, each Bid must be submitted to the City of Lowell Purchasing Department located at 375 Merrimack Street, 3rd Floor, Room 60, Lowell, MA 01852, in a sealed envelope which is plainly marked on the outside with the name and address of the Bidder, the title of the Project, the portion of the Work which the Bid represents, and the date and time of the Bid opening. A separate Bid must be submitted for each Filed Sub-Bid. Any hand delivered Bid received after the deadline will not be accepted. Any other Bid received after the deadline will be returned to the addressee. Any Bid submitted to any other office or department of the City and received by the Purchasing Department after the deadline for receipt of Bids will not be accepted. It is the responsibility of the Bidder to ensure that its Bid is received by the Purchasing Department in a timely fashion. The deadline for receipt of Bids can be extended by Addendum only.

Bids may not be submitted orally, by facsimile, by telephone, or by any other method except for the methods described above.

MODIFICATION OF A BID.

A Bid may be modified only by submitting any such modification in the form of a document executed in the same manner as a Bid, delivered in a sealed envelope in the same manner as a Bid, designated as a modification to the original Bid and submitted to the Special Projects Office prior to the time designated for the opening of Bids.

WITHDRAWAL OF A BID.

Prior to Bid opening. A Bid may be withdrawn before the time designated for opening Bids. The Bidder requesting such withdrawal must make the request in writing and in a specific manner designated by the City if the City so requires. Withdrawal of a Bid prior to the Bid opening time will not prejudice the right of a Bidder to resubmit a Bid. A Bid cannot be withdrawn after the Bid opening time except as provided by law.

After Bid opening. In the case of death, disability, bona fide clerical error or mechanical error of a substantial nature or other unforeseen circumstances affecting a Bidder, a Bidder may withdraw its Bid after the time designated for Bid opening, if within five (5) days of the date designated for opening its Bid, such Bidder submits a statement under the penalties of perjury to the Purchasing Department detailing the basis for withdrawal. The City will then make a determination as to whether such Bidder has satisfied both the statutory and City requirements for such withdrawal. If the City is satisfied, the Bid Deposit will be returned to such Bidder. *Reference: M.G.L. c. 149, §§44B(3) and (4).*

BID OPENING.

All Bids received prior to the date and time designated for the Bid opening will be opened publicly and read aloud at the Purchasing Department. *Reference: M.G.L. c. 149, §§44E(3) and F(3).*

BIDDERS LIST.

Sub-bidders. At least two (2) business days prior to the date for opening general Bids, the City shall mail to every person on record as having taken a set of plans and specifications a list of Sub-Bidders arranged by sub-trades and listing for each sub-trade the name, address and Sub-Bid price of every Sub-Bidder submitting a Sub-Bid thereon not rejected by the City and the names of the General Bidders excluded from using such Sub-Bid. A person shall not be named by a General Bidder as a Sub-Bidder for a sub-trade on the General Bid form unless such person is included for such sub-trade in said list. If a General Bidder not excluded in said list from doing so names as a Sub-Bidder for a sub-trade on the General Bid form a person included for such sub-trade in said list at the Sub-Bid price stated in said list, neither the General Bid of such General Bidder nor the general contract executed on the basis of such General Bid shall be invalid or rejected because of the invalidity of such Sub-Bid, or because of error on said list, nor shall such General Bid be rejected nor shall such general contract be invalid because of any invalid action taken by the City in connection with any Sub-Bid or Sub-Bids; but there shall be a substitution of Sub-Bidders and an adjustment of the contract price as if paragraph (c) of section forty-four F(4) were applicable. *Reference: M.G.L. c. 149, §44F(3).*

PUBLIC BID REVIEW AND INSPECTION.

Upon opening, all Bids become public records except for portions thereof that are not subject to public disclosure as a matter of law. *Reference: M.G.L. c. 149, §44D(2).*

Bids may be reviewed by the public in a manner set forth by the Purchasing Department.

Any Bidder who objects to a Bid may protest the Bid. In order to be considered, the protest must be received by the Purchasing Department within two (2) business days after the Bid opening date. The protest must be in writing, must state in detail the basis for the protest, and must be signed by the protester.

7. RESERVATION OF RIGHTS TO REJECT BIDS

GENERAL AND SUB-BIDS.

The City reserves the right to reject any or all general Bids, if it is in the public interest to do so. The City reserves the right to reject any Sub-Bid on any sub-trade, if it determines that such Sub-Bid does not represent the Sub-Bid of a person or entity competent to perform the Work as specified or that less than three such Sub-Bids were received and that the prices are not reasonable for acceptance without further competition. *Reference: M.G.L. c. 149, §44E(1).*

The City reserves the right to reject any or all Bids if it determines that the Bidder does not possess the qualifications to perform the Work specified in the Bidding Documents.

The City reserves the right to reject the Bid of any Bidder who the City has determined has not completed a prior project, whether with the City or elsewhere, because of the fault of the Bidder, its Subcontractors or employees; has been declared in default on a prior contract whether with the City or elsewhere; has failed to complete a prior project in a timely fashion whether with the City or elsewhere; based on its work record, is not capable of performing the within Contract whether due to lack of sufficient prior experience, as determined by the City, or any other reason; has a work record of its Subcontractors demanding direct payment from the City; has a work record of its Subcontractors, employees or material suppliers complaining to the City or other awarding authority regarding the Bidder's failure to pay them; has a record of complaints made to the City or other awarding authority by persons offended by the behavior of the Bidder, its Subcontractors or employees; or has a record of its failure to comply with the Commonwealth and/or City laws or requirements. "Work record" or "record" constitutes a minimum of one event in the work history of the Bidder.

SUB-BIDS.

Within two business days after the Bid opening, the City shall reject every Sub-Bid which is not accompanied by a Bid deposit as prescribed in sub-section (2) of section forty-four B, or which otherwise does not conform with sections forty-four A to forty-four H, inclusive, or which is on a form not completely filled in, or which is incomplete, conditional or obscure, or which contains any addition not called for; provided, however, that the failure of the City to reject such Sub-Bid within such period shall not validate such a Sub-Bid nor preclude the City from subsequently rejecting it. No Sub-Bid shall be rejected because of the failure to submit prices for or information relating to any item or items for which no space is provided on the Sub-Bid form furnished by the City, but this sentence shall not be applicable to any failure to furnish prices or information required by section forty-four F to be furnished in the Form for Sub-Bid. *Reference: M.G.L. c. 149, §44F(3).*

GENERAL BIDS.

The City shall reject every general Bid which is not accompanied by a Bid deposit as prescribed in sub-section (2) of section forty-four B, or which otherwise does not conform with sections forty-four A to forty-four H, inclusive, or which is on a form not completely filled in, or which is incomplete, conditional or obscure, or which contains any addition not called for. No such Bid shall be rejected because of the failure to submit prices form or information relating to any item or items for which no specific space is provided in the Bid form furnished by the City. No General Bid shall be rejected (1) because the sum of the prices for all work of the general contractor and Sub-Bids does not equal the General Bid price set forth on the Bid form for that purpose or (2) because of error in setting forth the name, the Sub-Bid price of a Sub-Bidder, or the total Sub-Bids as long as the Sub-Bidder or Sub-Bidders designated are clearly identifiable, or (3) because the plans and specifications do not accompany the Bid or are not submitted with the Bid. *Reference: M.G.L. c. 149, §44E(3).*

8. AWARD OF CONTRACT

The City shall award the contract to the lowest responsible (demonstrably possessing the skill, ability, and integrity necessary to faithfully perform the work called for by the Contract, based upon a determination of competent workmanship and financial soundness in accordance with the provisions of M.G.L. c. 149, §44D-see M.G.L. c. 149, §44A(1)) and eligible (able to meet all requirements for Bidders set forth in M.G.L. c. 149, §§44A-H and not debarred from bidding under §44C or any other applicable law, and who shall certify that it is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work-see M.G.L. c. 149, §44A(1)) General Bidder within thirty (30) Business Days after the date of the opening of the General Bids. If the Bidder selected as the general contractor fails to perform its agreement to execute a general contract in accordance with the terms of its Bid and furnish a performance bond and

a labor and materials or payment bond as stated in its Bid in accordance with M.G.L. c. 149, §44E, an award shall be made to the next lowest responsible and eligible Bidder, subject to the provision of M.G.L. c. 149, §§44A-H, inclusive. The thirty-day time limit shall not be applicable to a second or subsequent award made after the expiration of the time limit with the consent of the next lowest responsible and eligible Bidder, and made because the original award made within the time limit was invalid, or because the Bidder failed to execute the Agreement or to provide a performance and labor and materials or payment bond.

Any General Bidder who fails to perform its agreement to execute a Contract and furnish a performance bond and a labor and materials or payment bond shall forfeit its Bid deposit which shall become the property of the City, but the amount forfeited shall not exceed the difference between its Bid price and the Bid price of the next lowest responsible and eligible bidder. *Reference: M.G.L. c. 149, §44B(3).*

If a selected Sub-Bidder fails to perform its agreement to execute a sub-contract with the General Bidder selected as the general contractor, contingent upon the execution of the general contract, and, if requested to do so in the General Bid by such General Bidder to furnish a performance and payment bond as stated in its Sub-Bid in accordance with §44F(2), the Bid deposit of such Sub-Bidder shall become and be the property of the City as liquidated damages, provided that the amount retained shall not exceed the difference between its Bid price and the Bid price of the next lowest responsible and eligible Sub-Bidder. *Reference: M.G.L. c. 149, §44B(4).*

The City will notify the selected General Bidder and all other Bidders of the award.

The City will submit to the selected General Bidder a Notice of Award and at least four (4) unsigned copies of the Agreement between the City and the Contractor. The selected General Bidder will be required to return to the Special Projects Office within ten (10) business days of the date notice of award all of the copies of the Agreement between the City and the Contractor signed, its performance bond, its labor and materials or payment bond and all required certificates of insurance. Failure of the selected General Bidder to submit all of the required documents in a timely fashion may result in the withdrawal of the award. The City will return one fully signed copy of the Agreement to the Contractor. Time is of the essence in the performance of the Agreement.

9. COMPLETION TIME

Bidder must agree to commence work on or before **10** days following receipt of a written "Notice to Proceed" of the Owner and to fully complete the project within eighteen (18) months of date of "Notice to Proceed."

END OF INFORMATION FOR AND INSTRUCTIONS TO BIDDERS

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell
Project No. 16-2526.01

Construction Documents
April 2015

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FORM FOR GENERAL BID-004100

To the Awarding Authority:

- A. The undersigned proposes to furnish all labor and materials required for

**CITY OF LOWELL
IFB16-22
LEO A. ROY & LOWER LOCKS
PARKING GARAGE RESTORATION
100 MARKET STREET & 90 WARREN STREET
LOWELL, MA**

in accordance with the accompanying plans and specifications prepared by:

**WALKER RESTORATION CONSULTANTS
20 PARK PLAZA, SUITE 1202
BOSTON, MA 02116**

including all Labor and Materials, for the contract price specified below, subject to additions and deductions according to the terms of the specifications.

- B. This bid includes addenda (s) numbered _____
- C. The proposed contract price (in words) is _____ DOLLARS
(\$ _____)
- D. The subdivision of the proposed contract price is as follows:

Item 1. The work of the General Contractor, being all work other than that covered by Item 2:
\$ _____

Item 2. Sub-bids as follows:

Sub-trade	Name of Sub-bidder	Amount	Bonds Required Indicated By "Yes" or "No".
Waterproofing			
Painting			
Plumbing			
Masonry			
Fire Protection System			
Electrical			
<u>Total</u>			

The undersigned agrees that that above-named sub-bidder will be used for the work indicated at the amount stated, unless a substitution is made. The undersigned further agrees to pay the premiums for the performance and payment bonds furnished by the sub-bidder as requested herein and that all of the

cost of all such premiums is included in the amount set forth in Item 1 of this bid.

The undersigned agrees that if he/she is selected as General Contractor, he/she will promptly confer with the Awarding Authority on the question of sub-bidders; and that the Awarding Authority may substitute for any sub-bid listed above a sub-bid duly filed with the Awarding Authority by another sub-bidder for the sub-trade against whose standing and ability the undersigned makes no objection; and that the undersigned will use all such finally selected sub-bidders at the amounts named in their respective sub-bids and be in every way as responsible for them and their work as if they had been originally named in this general bid, the total contract price being adjusted to conform thereto.

E. Bidder understands that the owner reserves the right to reject any or all bids and to waive any minor informalities in the bidding prices.

F. The undersigned agrees if selected as General Contractor, within seven working days after presentation thereof by the City, the Contractor will:

1. execute a contract in accordance with the terms of this general bid;
2. furnish a performance bond and a labor and materials or payment bond;
 - a. of a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the City;
 - b. in the sum of one hundred percent of the contract price;
 - c. premiums for each are to be paid by the General Contractor.
3. provide an Insurance certificate specifying the City of Lowell as Named Insured.

The City of Lowell further requires that within 30 days after being selected, the General Contractor furnish the City with a copy of all insurance policies.

G. Bidder understands that the Owner reserves the right to reject any or all bids and to waive any minor informalities in the bidding prices.

H. Amounts are to be shown in both words and figures. In case of discrepancy, the amount shown in words will govern.

I. The bidder hereby certifies it shall comply with the minority workforce ratios and specific action contained in the City of Lowell Ordinances governing employment, City of Lowell Minority Business Enterprise Program and the Americans with Disabilities Act. The contractor receiving the award of the contract shall be required to obtain from each of its subcontractors and submit to the contracting or administering agency prior to the performance of any work under said contract a certification by said subcontractor, regardless of tier, that it will comply with same.

J. The bidder agrees that this bid shall be good and may not be withdrawn for a period of 30 days (excluding weekends and holidays) after the scheduled closing time for receiving bids.

K. The bid security attached in the sum of (\$_____) is to become the property of the

Owner in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the Owner caused thereby.

L. The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work.

M. As required by M.G.L. c. 62C, §49A, the undersigned certifies under the penalties of perjury that the bidder has complied with all laws of the commonwealth relating to taxes. The undersigned hereby certifies under the penalties of perjury that this bid is in all respects bona fide, fair and made without collusion or fraud with any other person. As used in this subsection the word "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity.

The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the commonwealth under the provisions of section twenty-nine F of chapter twenty-nine, or any other applicable debarment provision of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

N. The undersigned agrees to commence work on the Contract within seven (7) calendar days from receipt of written notice to proceed issued by the Owner and to thereafter diligently and continuously carry on the work. He agrees to substantially complete the work of this Contract on or before the date of substantial completion set forth in the Contract Agreement.

Date _____

BY:

(Signature)

(Name of General Bidder)

(Title)

(Business Address)

(City and State)

O. GENERAL REQUIREMENTS – LEO A. ROY & LOWER LOCKS PARKING GARAGES

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
1.2	Concrete Formwork	Incidental to Work Item 1.1			
1.3	Concrete Shores & Reshores	Incidental to Work Item 1.1			
1.4	Concrete Reinforcement	LBS.	4,000		\$
1.5	Temporary Signage	Incidental to Work Item 1.1			
1.6	Scaffolding	Incidental to Work Item 1.1			
1.7	Overhead Protection/Traffic Control	Incidental to Work Item 1.1			
1.8	Coordination & Management of Filed Sub-Bidders	Incidental to Work Item 1.1			
	SUBTOTAL THIS PAGE (Page 004100-4)				\$

P. LIST OF UNIT PRICES – LEO A. ROY PARKING GARAGES

State the Unit Prices on the Following Forms:

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
3.0	CONCRETE FLOOR REPAIR				
3.2LR	Floor Repair – Partial Depth (P/T)	S.F.	11,500		\$
3.3LR	Floor Repair – Full Depth (P/T)	S.F.	1,000		\$
3.4	Floor Repair – Curbs/Walks	S.F.	50		\$
3.5	Floor Repair – Partial Depth (CIP)	S.F.	250		\$
3.6	Floor Repair – Full Depth (CIP)	S.F.	1,000		\$
3.8LR	Floor Repair – Scaled Concrete Surface	S.F.	20,000		\$
3.9LR	Floor Repair – Deep Scaled Concrete Surface	S.F.	2,000		\$
3.10LR	Floor Repair – Stair Nosings	S.F.	60		\$
3.11LR	Floor Repair – Replace Pedestrian Bridge Deck Slab	L.S.			\$
4.0	CONCRETE CEILING REPAIR				
4.1	Ceiling Repair – Partial Depth / Shallow	S.F.	500		\$
4.2	Ceiling Repair – Partial Depth / Deep	S.F.	1,800		\$
	SUBTOTAL THIS PAGE (Page 004100-5)				\$

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
5.0	CONCRETE BEAM AND JOIST REPAIR				
5.1	Beam Repair – Partial Depth / Shallow	S.F	200		\$
5.2	Beam Repair – Partial Depth / Deep	S.F.	100		\$
5.5LR	Beam Repair – Partial Depth / Shallow @ Exp Joint	S.F.	50		\$
6.0	CONCRETE COLUMN REPAIR				
6.1	Column Repair – Partial Depth / Shallow	S.F.	300		\$
6.2	Column Repair – Partial Depth / Deep	S.F.	400		\$
6.3LR	Column Repair – Partial Depth / Shallow @ Exp Joint	S.F.	30		\$
6.4LR	Column Repair – Partial Depth / Deep @ Exp. Joint	S.F.	20		\$
7.0	CONCRETE WALL REPAIR				
7.1	Wall Repair – Partial Depth / Shallow	S.F.	200		\$
9.0	CRACKS & JOINTS – EXPANSION JOINT EDGE PREPARATION				
9.3LR	Repair Concrete Wash and Blockout	L.F.	1,000		\$
12.0	BITUMINOUS / ASPHALT REPAIR				
12.1LR	Asphalt Patching	S.F.	600		\$
	SUBTOTAL THIS PAGE (Page 004100-6)				\$

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
21.0	P/T SYSTEM REPAIR (MONOSTRAND)				
21.1LR	Replace Grout @ P/T Anchorages	EA.	50		\$
21.2LR	Protect Exposed P/T Tendons	Incidental to WI 3.0, 4.0 & 5.0			
21.3LR	New P/T Tendon End Anchorage (Live)	EA	10		\$
21.4LR	New P/T Tendon End Anchorage (Dead)	EA	10		\$
21.6LR	Tendon Splice Coupling (Center-Pull)	EA	10		\$
21.7LR	Tendon Splice Coupling (Single)	EA	10		\$
21.8LR	Tendon Splice Coupling (Double)	EA	5		\$
21.9LR	P/T Tendon Material	L.F.	200		\$
37.0	DOORS, FRAMES AND HARDWARE				
37.1	Door and Frame Replacement	EA.	10		\$
41.0	STEEL STAIRS				
41.1	Replace Stair Riser, Pan and Concrete Fill	EA.	55		\$
41.2	Replace Stair Nosing	EA.	10		\$
41.4	Replace Stair Landing / Fill	EA.	3		\$
	SUBTOTAL THIS PAGE (Page 004100-7)				\$

	SUBTOTAL PAGE 004100-5	\$
	SUBTOTAL PAGE 004100-6	\$
	SUBTOTAL PAGE 004100-7	\$
	TOTAL – LEO A. ROY PARKING GARAGE	\$

Q. LIST OF UNIT PRICES – LOWER LOCKS PARKING GARAGE

State the Unit Prices on the Following Forms:

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
2.0	FLOOR SURFACE PREPARATION				
2.6LL	Floor Preparation – Traffic Topping Removal	S.F.	5,650		\$
3.0	CONCRETE FLOOR REPAIR				
3.4	Floor Repair – Curbs/Walks	S.F.	250		\$
3.5	Floor Repair – Partial Depth (CIP)	S.F.	3,800		\$
3.6	Floor Repair – Full Depth (CIP)	S.F.	5,000		\$
3.7LL	Floor Repair – Concrete Washes	S.F.	8,000		\$
4.0	CONCRETE CEILING REPAIR				
4.1	Ceiling Repair – Partial Depth / Shallow	S.F.	500		\$
4.2	Ceiling Repair – Partial Depth / Deep	S.F.	1,000		\$
5.0	CONCRETE BEAM REPAIR				
5.1	Beam Repair – Partial Depth / Shallow	S.F.	50		\$
5.2	Beam Repair – Partial Depth / Deep	S.F.	100		\$
5.3LL	Beam Repair – Partial Depth / Shallow	S.F.	25		\$
5.4LL	Beam Repair – Partial Depth / Deep	S.F.	75		\$
SUBTOTAL THIS PAGE (Page 004100-8)					\$

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
6.0	CONCRETE COLUMN REPAIR				
6.1	Column Repair – Partial Depth / Shallow	S.F.	150		\$
6.2	Column Repair – Partial Depth/ Deep	S.F.	350		\$
6.6LL	Column Repair - Haunches	S.F.	50		\$
7.0	CONCRETE WALL REPAIR				
7.1	Wall Repair – Partial Depth / Shallow	S.F.	10		\$
8.0	PRECAST CONCRETE TEE BEAM REPAIR				
8.1LL	Tee Stem Repair – Partial Depth / Shallow	S.F.	50		\$
8.2LL	Tee Stem Repair – Partial Depth / Deep	S.F.	150		\$
8.3LL	Tee Stem Repair - Encasement	EA.	4		\$
8.4LL	Tee Flange Repair – Partial Depth	S.F.	600		\$
8.5LL	Tee Flange Repair – Full Depth	S.F.	3000		\$
9.0	CRACKS AND JOINTS – EXPANSION JOINT EDGE PREPARATION				
9.1LL	New Blockout	L.F.	720		\$
9.2LL	New Concrete Wash w/Blockout	L.F.	240		\$
	SUBTOTAL THIS PAGE (Page 004100-9)				\$

37.0	DOORS, FRAMES AND HARDWARE				
37.1	Door and Frame Replacement	EA.	2		\$
40.0	CONNECTIONS / BEARINGS				
40.1LL	Shear Transfer Device	EA.	150		\$
40.3LL	Re-weld Shear Connector	EA.	350		\$
40.4LL	Shear Connector Replacement	EA.	100		\$
41.0	STEEL STAIRS				
41.2	Replace Stair Nosings	EA.	80		\$
41.4	Replace Stair Landing / Fill	EA.	10		\$
90.0	FAÇADE CLEANING				
90.1	Clean Façade – Detergent & Pressure Washing	L.S.			\$
	SUBTOTAL THIS PAGE (Page 004100-10				\$

	SUBTOTAL PAGE 004100-8	\$
	SUBTOTAL PAGE 004100-9	\$
	SUBTOTAL PAGE 004100-10	\$
	TOTAL – LOWER LOCKS PARKING GARAGE	\$

TOTAL BID

GENERAL REQUIREMENTS TOTAL: PAGE 004100-4	\$
LEO A. ROY PARKING GARAGE TOTAL: PAGE 004100-7	\$
LOWER LOCKS PARKING GARAGE TOTAL: PAGE 004100-10	\$
FILED SUB-BIDS	\$
TOTAL BID	\$

Description of Abbreviations:

L.F. = Lineal Feet
EA. = Each
S.F. = Square Feet
L.S. = Lump Sum
LBS. = Pounds

END OF SECTION 004100

004210A - FORM FOR SUB-BID WATERPROOFING

To All General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing in accordance with the hereinafter described plans, specifications and addenda, all the work specified Section #071800, 071900, 079233, 079236 and 079500. Section Name: Traffic Coatings, Water Repellents, Concrete Joint Sealants, Architectural Joint Sealants and Expansion Joint Assemblies of the specifications, attached Work Item Unit Price Form and related work items in Section 020010 and in any plans specified in such section, prepared by Walker Restoration Consultants for The Leo Roy and Lower Locks Parking Garage Restoration Lowell, Massachusetts, for the contract sum (in words) of _____ dollars (\$ _____).

B. This sub-bid includes addenda numbered _____

C. This sub-bid:

☐ may be used by any general bidder except: _____

☐ may only be used by the following general bidders

(To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.)

D. The undersigned agrees that if s/he is selected as a sub-bidder, s/he will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his/her own payroll and in the absence of a contrary provision in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by undersigned]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.

G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that s/he, by those documents, assumes toward the owner.

H. The undersigned offers the following information as evidence of his/her qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name for _____ years.
2. Ever failed to complete any work awarded? _____.
3. List one or more recent buildings with names of general contractor and architect on which you served as subcontractor for work of similar character as required for the above-named building.

	Building	Architect	General Contractor	Amount Of Contract
(a)	_____			
(b)	_____			
(c)	_____			

4. Bank Reference: _____

I. The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards of subcontractors subject to section 44 F. As required by M.G.L. c., 62C, S49A, the undersigned certifies under the penalties of perjury that the bidder has complied with all laws of the Commonwealth relating to taxes. The undersigned further certifies under penalty of perjury that this subbid is in all respects bona fide, fair, and made without collusion or fraud with any other person. As used in this subsection the work "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Sec. 29 F of Chapter 29, or any other applicable debarment provision of any other chapter of the General Laws or any rule or regulation

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell IFB16-22
Project No. 16-2526.01

Construction Documents
August 5, 2015

promulgated thereunder.

Date_____

(Name of Sub-bidder)

By_____
(Title & Name of Person Signing Bid)

(Business Address)

(City and State)

J. LIST OF UNIT PRICES FOR LEO A. ROY PARKING GARAGE WATERPROOFING SUB-BID

State Unit Prices on the following forms and submit with Waterproofing Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
10.0	EXPANSION JOINT REPAIR AND REPLACEMENT				
10.3	Expansion Joint – Elastomeric Concrete Edged	L.F.	1,000		\$
10.5	Expansion Joint – Adhered Vertical Wall Joint	L.F.	50		\$
11.0	CRACK AND JOINT REPAIR				
11.1	Rout & Seal Random Cracks	L.F.	500		\$
11.3	Replace Crack / Joint Sealant	L.F.	2,200		\$
11.4	Tool and Seal Patch Perimeters	Incidental to Work Item Series 16.0			
11.5	Tool and Seal Control Joints	Incidental to Work Item Series 16.0			
11.7	Cove Sealant	L.F.	2,500		\$
15.0	PROTECTIVE SEALER				
15.1LR	Concrete Sealer – Floors	S.F.	73,500		\$
16.0	TRAFFIC TOPPING				
16.1	Traffic Topping - Vehicular	S.F.	200,000		\$
16.8LR	Traffic Topping – Steep Ramps	S.F.	25,000		\$
	TOTAL – LEO A. ROY PARKING GARAGE				\$

K. LIST OF UNIT PRICES FOR LOWER LOCKS PARKING GARAGE WATERPROOFING SUB-BID

State Unit Prices on the following forms and submit with Waterproofing Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
10.0	EXPANSION JOINT REPAIR AND REPLACEMENT				
10.3	Expansion Joint – Elastomeric Concrete Edged	L.F	960		\$
11.0	CRACK AND JOINT REPAIR				
11.1	Rout & Seal Random Cracks	Incidental to Work Item Series 16.0			
11.2LL	Replace Joint Sealant in Precast Floor System	L.S.			\$
11.3	Replace Crack / Joint Sealant	Incidental to Work Item Series 16.0			
11.4	Tool and Seal Patch Perimeters	Incidental to Work Item Series 3.0 & 8.0			
11.5	Tool and Seal Control Joints	Incidental to Work Item Series 3.0 & 16.0			
11.7	Cove Sealant	Incidental to Work Item Series 16.0			
16.0	TRAFFIC TOPPING				
16.1	Traffic Topping – Vehicular	S.F.	40,000		\$
	TOTAL – LOWER LOCKS PARKING GARAGE				\$

LEO A. ROY PARKING GARAGE TOTAL: PAGE 004210A-4	\$
LOWER LOCKS PARKING GARAGE TOTAL: PAGE 004210A-5	\$
WATERPROOFING FILED SUB-BID TOTAL	\$

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell IFB16-22
Project No. 16-2526.01

Construction Documents
August 5, 2015

Description of Abbreviations:

L.F. = Lineal Feet

S.F. = Square Feet

L.S. = Lump Sum

END OF SECTION 004210A

004210B - FORM FOR SUB-BID FOR PAINTING

To All General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section #099113 and 099120 Section Name: Exterior Painting and Pavement Marking of the specifications, attached Work Item Unit Price Form and related work items in Section 020010, and in any plans specified in such section, prepared by Walker Restoration Consultants for The Leo Roy and Lower Locks Parking Garage Restoration Lowell, Massachusetts, for the contract sum (in words) of _____ dollars (\$_____).

B. This sub-bid includes addenda numbered _____

C. This sub-bid:

☐ may be used by any general bidder except: _____

☐ may only be used by the following general bidders

(To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.)

D. The undersigned agrees that if s/he is selected as a sub-bidder, s/he will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his/her own payroll and in the absence of a contrary provision in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by undersigned]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.

G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that s/he, by those documents, assumes toward the owner.

H. The undersigned offers the following information as evidence of his/her qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name for _____ years.
2. Ever failed to complete any work awarded? _____.
3. List one or more recent buildings with names of general contractor and architect on which you served as subcontractor for work of similar character as required for the above-named building.

	Building	Architect	General Contractor	Amount Of Contract
(a)	_____			
(b)	_____			
(c)	_____			

4. Bank Reference: _____

I. The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards of subcontractors subject to section 44 F. As required by M.G.L. c., 62C, S49A, the undersigned certifies under the penalties of perjury that the bidder has complied with all laws of the Commonwealth relating to taxes. The undersigned further certifies under penalty of perjury that this subbid is in all respects bona fide, fair, and made without collusion or fraud with any other person. As used in this subsection the work "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Sec. 29 F of Chapter 29, or any other applicable debarment

provision of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Date_____

(Name of Sub-bidder)

By_____
(Title & Name of Person Signing Bid)

(Business Address)

(City and State)

J. LIST OF UNIT PRICES FOR PAINTING SUB-BID – LEO A. ROY PARKING GARAGE

State Unit Prices on the following forms and submit with Painting Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
45.0	PAINTING				
45.1	Paint Traffic Markings	L.S.			\$
45.3	Clean and Paint Doors and Frames	L.S.			\$
45.6	Clean and Paint Stair Risers, Railings and Framing	L.S.			\$
45.7LR	Clean and Paint Shelf Angles	L.S.			\$
45.9LR	Clean and Paint Level 4 Pedestrian Bridge Structural Steel Framing	L.S.			\$
	TOTAL – LEO A. ROY PARKING GARAGE				\$

K. LIST OF UNIT PRICES FOR PAINTING SUB-BID – LOWER LOCKS PARKING GARAGE

State Unit Prices on the following forms and submit with Painting Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
45.0	PAINTING				
45.1	Paint Traffic Markings	L.S.			\$
45.3	Clean and Paint Doors and Frames	L.S.			\$
45.4LL	Clean and Paint Pipe Guards	EA	38		\$
45.6	Clean and Paint Stair Risers, Railings and Framing	L.S.			\$
	TOTAL – LOWER LOCKS PARKING GARAGE				\$

LEO A. ROY PARKING GARAGE TOTAL: PAGE 004210B-4	\$
LOWER LOCKS PARKING GARAGE TOTAL: PAGE 004210B-4	\$
PAINTING FILED SUB-BID TOTAL	\$

Description of Abbreviations:

L.S. = Lump Sum
EA. = Each

END OF SECTION 004210B

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004210C - FORM FOR SUB-BID FOR PLUMBING

To All General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section #220500 and 221413. Section Name: Common Work Results for Plumbing and Facility Storm Drainage Plumbing of the specifications, attached Work Item Unit Price Form and related work items in Section 020010, and in any plans specified in such section, prepared by Walker Restoration Consultants for The Leo Roy and Lower Locks Parking Garage Restoration Lowell, Massachusetts, for the contract sum (in words) of _____ dollars (\$ _____).

B. This sub-bid includes addenda numbered _____

C. This sub-bid:

☐ may be used by any general bidder except: _____

☐ may only be used by the following general bidders

(To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.)

D. The undersigned agrees that if s/he is selected as a sub-bidder, s/he will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his/her own payroll and in the absence of a contrary provision in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by undersigned]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.

G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that s/he, by those documents, assumes toward the owner.

H. The undersigned offers the following information as evidence of his/her qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name for _____ years.
2. Ever failed to complete any work awarded? _____.
3. List one or more recent buildings with names of general contractor and architect on which you served as subcontractor for work of similar character as required for the above-named building.

	Building	Architect	General Contractor	Amount Of Contract
(a)	_____			
(b)	_____			
(c)	_____			

4. Bank Reference: _____

I. The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards of subcontractors subject to section 44 F. As required by M.G.L. c., 62C, S49A, the undersigned certifies under the penalties of perjury that the bidder has complied with all laws of the Commonwealth relating to taxes. The undersigned further certifies under penalty of perjury that this subbid is in all respects bona fide, fair, and made without collusion or fraud with any other person. As used in this subsection the work "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Sec. 29 F of Chapter 29, or any other applicable debarment provision of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell IFB16-22
Project No. 16-2526.01

Construction Documents
August 5, 2015

Date_____

(Name of Sub-bidder)

By_____
(Title & Name of Person Signing Bid)

(Business Address)

(City and State)

J. LIST OF UNIT PRICES FOR LEO A. ROY PARKING GARAGE PLUMBING FILED SUB-BID. State Unit Prices on the following forms and submit with Plumbing Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
25.0	MECHANICAL – DRAINAGE				
25.2	Mechanical – Replace Existing Floor Drains	EA.	100		\$
25.3	Mechanical – Pipe and Hangers	L.F.	1,700		\$
25.4	Mechanical – Supplementary Floor Drains	EA.	20		\$
25.6	Mechanical – Clean Existing Drains, Pipes and Oil/Sand Separator	L.S.			\$
	TOTAL – LEO A. ROY PARKING GARAGE				
					\$

K. LIST OF UNIT PRICES FOR LOWER LOCKS PARKING GARAGE PLUMBING FILED SUB-BID. State Unit Prices on the following forms and submit with Plumbing Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
25.0	MECHANICAL – DRAINAGE				
25.2	Mechanical – Replace Existing Floor Drains	EA.	160		\$
25.3	Mechanical – Pipe and Hangers	L.F.	2,000		\$
25.4	Mechanical – Supplementary Floor Drains	EA.	4		\$
25.6	Mechanical – Clean Existing Drains, Pipes and Oil/Separator	L.S.			\$
	TOTAL – LOWER LOCKS PARKING GARAGE				
					\$

LEO A. ROY PARKING GARAGE TOTAL: PAGE 004210C-4	\$
LOWER LOCKS PARKING GARAGE TOTAL: PAGE 004210C-4	\$
PLUMBING FILED SUB-BID TOTAL	\$

Description of Abbreviations:

L.F. = Lineal Feet

EA. = Each

L.S. = Lump Sum

END OF SECTION 004210C

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004210D - FORM FOR SUB-BID MASONRY

To All General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing in accordance with the hereinafter described plans, specifications and addenda, all the work specified Section #040120 and 042010. Section Name: Maintenance of Unit Masonry and Unit Masonry of the specifications, attached Work Item Unit Price Form and related work items in Section 020010 and in any plans specified in such section, prepared by Walker Restoration Consultants for The Leo Roy and Lower Locks Parking Garage Restoration Lowell, Massachusetts, for the contract sum (in words) of _____ dollars (\$ _____).

B. This sub-bid includes addenda numbered _____

C. This sub-bid:

☐ may be used by any general bidder except: _____

☐ may only be used by the following general bidders

(To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.)

D. The undersigned agrees that if s/he is selected as a sub-bidder, s/he will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his/her own payroll and in the absence of a contrary provision in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by undersigned]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.

G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that s/he, by those documents, assumes toward the owner.

H. The undersigned offers the following information as evidence of his/her qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name for _____ years.
2. Ever failed to complete any work awarded? _____.
3. List one or more recent buildings with names of general contractor and architect on which you served as subcontractor for work of similar character as required for the above-named building.

	Building	Architect	General Contractor	Amount Of Contract
(a)	_____			
(b)	_____			
(c)	_____			

4. Bank Reference: _____

I. The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards of subcontractors subject to section 44 F. As required by M.G.L. c., 62C, S49A, the undersigned certifies under the penalties of perjury that the bidder has complied with all laws of the Commonwealth relating to taxes. The undersigned further certifies under penalty of perjury that this subbid is in all respects bona fide, fair, and made without collusion or fraud with any other person. As used in this subsection the work "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell IFB16-22
Project No. 16-2526.01

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of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Sec. 29 F of Chapter 29, or any other applicable debarment provision of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Date _____

(Name of Sub-bidder)

By _____
(Title & Name of Person Signing Bid)

(Business Address)

(City and State)

J. LIST OF UNIT PRICES FOR MASONRY SUB-BID

State Unit Prices on the following forms and submit with Masonry Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
35.0	BRICK/MASONRY REPAIRS				
35.1	Tuckpointing	S.F.	500		\$
35.2	Brick Masonry Unit Replacement	EA.	120		\$
35.4	Capstone Joint Repair	Incidental to Work Items 35.6			
35.5	Concrete Masonry Unit Replacement	EA.	10		\$
35.6	Capstone Flashing and Resetting	L.F.	450		\$
	TOTAL – LEO A. ROY PARKING GARAGE				\$

K. LIST OF UNIT PRICES FOR MASONRY SUB-BID

State Unit Prices on the following forms and submit with Masonry Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
35.0	BRICK/MASONRY REPAIRS				
35.1	Tuckpointing	S.F.	3,000		\$
35.2	Brick Masonry Unit Replacement	EA.	25		\$
35.3LL	Capstone Replacement	EA.	15		\$
35.4	Capstone Joint Repair	Incidental to Work Items 35.6 and 35.7			
35.5	Concrete Masonry Unit Replacement	EA.	50		\$
35.6	Capstone Flashing and Resetting	L.F.	225		\$

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
35.7LL	Capstone Resetting and Pointing	L.F.	1,000		\$
35.8LL	Concrete Masonry Unit Soap Repair	EA.	100		\$
TOTAL – LOWER LOCKS PARKING GARAGE					\$

LEO A. ROY PARKING GARAGE TOTAL: PAGE 004210D-4	\$
LOWER LOCKS PARKING GARAGE TOTAL: PAGE 004210D-5	\$
MASONRY FILED SUB-BID TOTAL	\$

Description of Abbreviations:

L.F. – Lineal Feet
S.F. – Square Feet
EA. - Each

END OF SECTION 004210D

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004210E - FORM FOR SUB-BID FOR FIRE SUPPRESSION

To All General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section #210500 Section Name: Common Work Results for Fire Suppression of the specifications, attached Work Item Unit Price Form and related work items in Section 020010, and Drawings FP0.00, FP0.01, FPD2.00 to FPD2.07, FP2.00 to FP2.07, FP5.00 and FP5.01 prepared by Walker Restoration Consultants for The Leo Roy and Lower Locks Parking Garage Restoration Lowell, Massachusetts, for the contract sum of (in words) _____ dollars (\$_____).

B. This sub-bid includes addenda numbered _____

C. This sub-bid:

☐ may be used by any general bidder except: _____

☐ may only be used by the following general bidders

(To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.)

D. The undersigned agrees that if s/he is selected as a sub-bidder, s/he will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his/her own payroll and in the absence of a contrary provision in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by undersigned]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.

G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that s/he, by those documents, assumes toward the owner.

H. The undersigned offers the following information as evidence of his/her qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name for _____ years.
2. Ever failed to complete any work awarded? _____.
3. List one or more recent buildings with names of general contractor and architect on which you served as subcontractor for work of similar character as required for the above-named building.

	Building	Architect	General Contractor	Amount Of Contract
(a)	_____			
(b)	_____			
(c)	_____			

4. Bank Reference: _____

I. The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards of subcontractors subject to section 44 F. As required by M.G.L. c., 62C, S49A, the undersigned certifies under the penalties of perjury that the bidder has complied with all laws of the Commonwealth relating to taxes. The undersigned further certifies under penalty of perjury that this subbid is in all respects bona fide, fair, and made without collusion or fraud with any other person. As used in this subsection the work "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public construction work in the Commonwealth under the provisions of Sec. 29 F of Chapter 29, or any other applicable debarment provision of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell IFB16-22
Project No. 16-2526.01

Construction Documents
August 5, 2015

Date_____

(Name of Sub-bidder)

By_____
(Title & Name of Person Signing Bid)

(Business Address)

(City and State)

J. LIST OF UNIT PRICES FOR FIRE SUPPRESSION SUB-BID

State Unit Prices on the following forms and submit with Fire Suppression Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
26.0	MECHANICAL – FIRE PROTECTION				
26.2LR	Mechanical – Demolish & Replace Fire Standpipe, Leo Roy Garage	L.S.			\$
	TOTAL – LEO ROY PARKING GARAGE				\$

K. LIST OF UNIT PRICES FOR FIRE SUPPRESSION SUB-BID

State Unit Prices on the following forms and submit with Fire Suppression Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
26.0	MECHANICAL – FIRE PROTECTION				
26.2LL	Mechanical - Demolish & Replace Fire Standpipe, Lower Locks Garage	L.S.			\$
	TOTAL – LOWER LOCKS PARKING GARAGE				\$

Description of Abbreviations: L.S. = Lump Sum

LEO A. ROY PARKING GARAGE TOTAL: PAGE 004210E-4	\$
LOWER LOCKS PARKING GARAGE TOTAL: PAGE 004210E-4	\$
FIRE SUPPRESSION FILED SUB-BID TOTAL	\$

END OF SECTION 004210E

004210F - FORM FOR SUB-BID FOR ELECTRICAL

To All General Bidders Except those Excluded:

A. The undersigned proposes to furnish all labor and materials required for completing in accordance with the hereinafter described plans, specifications and addenda, all the work specified in Section #260500 Section Name: Common Work Results for Electrical of the specifications, Drawings FA0.00, FAD1.00, FA1.00, FA1.01 and FA2.00 for Fire Alarm Demolition and Replacement at the Leo Roy Parking Garage and fire alarm modifications at the Lower Locks Parking Garage, attached Work Item Unit Price Form and related work items in Section 020010, prepared by Walker Restoration Consultants for The Leo Roy and Lower Locks Parking Garage Restoration Lowell, Massachusetts, for the contract sum of (in words) _____ dollars (\$_____).

B. This sub-bid includes addenda numbered _____

C. This sub-bid:

☐ may be used by any general bidder except: _____

☐ may only be used by the following general bidders

(To exclude general bidders, insert "X" in one box only and fill in blank following that box. Do not answer C if no general bidders are excluded.)

D. The undersigned agrees that if s/he is selected as a sub-bidder, s/he will within five days, Saturdays, Sundays, and legal holidays excluded, after presentation of a subcontract by the general bidder selected as the general contractor, execute with such general bidder a subcontract in accordance with the terms of this sub-bid and contingent upon the execution of the general contract, and, if requested so to do in the general bid by such general bidder, who shall pay the premiums therefor, furnish a performance and payment bond of a surety company qualified to do business under the laws of the commonwealth and satisfactory to the awarding authority, in the full sum of the subcontract price.

E. The names of all persons, firms and corporations furnishing to the undersigned labor or labor and materials for the class or classes or part thereof of work for which the provisions of the section of the specifications for this sub-trade require a listing in this paragraph, including the undersigned if customarily furnished by persons on his/her own payroll and in the absence of a contrary provision in the specifications, the name of each such class of work or part thereto and the bid price for such class of work or part thereof are:

Name	Class of Work	Bid Price
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

[Do not give bid price for any class or part thereof furnished by undersigned]

F. The undersigned agrees that the above list of bids to the undersigned represents bona fide bids based on the hereinbefore described plans, specifications and addenda and that, if the undersigned is awarded the contract, they will be used for the work indicated at the amounts stated, if satisfactory to the awarding authority.

G. The undersigned further agrees to be bound to the general contractor by the terms of the hereinbefore described plans, specifications, including all general conditions stated therein, and addenda, and to assume toward him all the obligations and responsibilities that s/he, by those documents, assumes toward the owner.

H. The undersigned offers the following information as evidence of his/her qualifications to perform the work as bid upon according to all the requirements of the plans and specifications:

1. Have been in business under present business name for _____ years.
2. Ever failed to complete any work awarded? _____.
3. List one or more recent buildings with names of general contractor and architect on which you served as subcontractor for work of similar character as required for the above-named building.

	Building	Architect	General Contractor	Amount Of Contract
(a)	_____			
(b)	_____			
(c)	_____			

4. Bank Reference: _____

I. The undersigned hereby certifies that s/he is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the work and that he will comply fully with all laws and regulations applicable to awards of subcontractors subject to section 44 F. As required by M.G.L. c., 62C, S49A, the undersigned certifies under the penalties of perjury that the bidder has complied with all laws of the Commonwealth relating to taxes. The undersigned further certifies under penalty of perjury that this subbid is in all respects bona fide, fair, and made without collusion or fraud with any other person. As used in this subsection the work "person" shall mean any natural person, joint venture, partnership, corporation or other business or legal entity. The undersigned further certifies under penalty of perjury that the said undersigned is not presently debarred from doing public

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell IFB16-22
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construction work in the Commonwealth under the provisions of Sec. 29 F of Chapter 29, or any other applicable debarment provision of any other chapter of the General Laws or any rule or regulation promulgated thereunder.

Date _____

(Name of Sub-bidder)

By _____
(Title & Name of Person Signing Bid)

(Business Address)

(City and State)

J. LIST OF UNIT PRICES FOR ELECTRICAL SUB-BID

State Unit Prices on the following forms and submit with Electrical Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
34.0	FIRE ALARM DEMOLITION & REPLACEMENT				
34.1LR	Electrical – Fire Alarm System Replacement, Leo A. Roy Garage	L.S.			\$
	TOTAL – LEO ROY PARKING GARAGE				\$

K. LIST OF UNIT PRICES FOR ELECTRICAL SUB-BID

State Unit Prices on the following forms and submit with Electrical Sub-Bid Form.

WORK ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	EXTENSION
1.0	GENERAL REQUIREMENTS				
1.1	Project Mobilization	L.S.			\$
34.0	FIRE ALARM DEMOLITION & REPLACEMENT				
34.2LL	Electrical – Fire Alarm Modifications, Lower Locks Garage	L.S.			\$
	TOTAL – LOWER LOCKS PARKING GARAGE				\$

LEO A. ROY PARKING GARAGE TOTAL: PAGE 004210F-4	\$
LOWER LOCKS PARKING GARAGE TOTAL: PAGE 004210F-4	\$
ELECTRICAL FILED SUB-BID TOTAL	\$

Description of Abbreviations: L.S. = Lump Sum

END OF SECTION 004210F

SECTION 004310
BID BOND
CITY OF LOWELL, MASSACHUSETTS

We, the undersigned, _____,

as Principal, and _____, as Surety, are hereby held and firmly bound unto the CITY OF LOWELL, a municipality in the County of Middlesex and Commonwealth of Massachusetts, in the penal sum of _____ Dollars (\$ _____), for the payment of which, well and truly to be made. We hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns.

The condition of the above obligation is such that the Principal has submitted to the City of Lowell, Massachusetts, a certain Bid attached hereto and hereby made a part hereof for the Project described as:

**Leo A. Roy & Lower Locks Parking Garage Restoration
Lowell, Massachusetts**

If the Principal fails to perform his/her/its agreement to execute a contract and furnish a performance bond and a labor and materials or payment bond as stated in his/her/its bid in accordance with the applicable state statute or fails in all other respects to perform the agreement created by the acceptance of said bid, his/her/its bid deposit shall become and be the property of the City of Lowell as liquidated damages.

If said Bid shall be rejected because of death, disability, bona fide clerical or mechanical error of a substantial nature, or other similar unforeseen circumstances affecting the Principal, his/her/its bid bond shall be returned to him/her/it.

The Surety, for value received, hereby agrees that its obligations and its bond shall in no way be impaired or affected by an extension of the time in which the City of Lowell may accept such bid and said Surety does hereby waive notice of any such extension.

Leo A. Roy & Lower Locks Parking Garage Restoration
City of Lowell
Project No. 16-2526.01

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IN WITNESS WHEREOF, the Principal and the Surety have set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and have caused this bond to be signed by their proper officers on this _____ day of _____, 2015.

SEAL

PRINCIPAL

SEAL

SURETY

SECTION 004519

NON-COLLUSION AFFIDAVIT

Contract/Bid Number: _____

State of _____:

County of _____:

I State that I am _____ (Title)

Of _____ [Name of Firm] and that I am authorized to make this Affidavit on behalf of firm and its owners, directors, and officers. I am the person responsible in firm for the price (s) and the amount of this Bid.

I state that:

1. The Price (s) and amounts of this Bid have been arrived at independently and without consultation, communication, or agreement with any other contractor, bidder, or potential bidder.

Neither the price nor the amount of this Bid, and neither the approximate price(s) nor approximate amount of this Bid, have been disclosed to any other firm or person who is a bidder or potential bidder, that they will not be disclosed before Bid opening.

No attempt has been made or will be made to induce any firm or person to refrain from bidding on this Contract, or to submit a Bid higher than this Bid, or to submit any intentionally high or noncompetitive Bid or other form of complementary Bid.

The Bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive Bid.

_____, [Name of Firm], its affiliates, subsidiaries, officers, directors, and employees are not currently under investigation by any government agency and have not in the last four years been convicted or found liable for any act involving conspiracy or collusion prohibited by state or federal law in any jurisdiction with respect to bidding on any public contract except as follows:

I state that _____ [Name of Firm] understand and acknowledges that the above representations are materials and important, and will be relied on by the City of Lowell in awarding the contract (s) for which this Bid is submitted. I understand and my firm understands that any misstatement in this Affidavit is and shall be treated as fraudulent concealment from the City of Lowell of the true facts relating to the submission of Bids for this Contract.

Name and Company Position

SWORN TO AND SUBSCRIBED BEFORE ME THIS

_____ DAY OF _____, 2011

(Notary Public)

My Commission Expires: _____

Notary Public Seal:

SECTION 004520

**CITY OF LOWELL
AFFIRMATIVE ACTION CONTRACT REQUIREMENTS
CONTRACTORS' CERTIFICATION**

NAME OF PROJECT: Leo A. Roy & Lower Locks Parking Garage Restoration Project

A contractor will not be eligible for award of a contract unless such contractor has submitted the following certification, which is deemed a part of the resulting contract:

CONTRACTOR'S CERTIFICATION

_____ certifies that

1. It intends to use the following listed construction trades in the work under the contract _____

_____; and,

2. Will comply with the minority manpower ratio and specific affirmative action steps contained herein; and

3. Will obtain from each of its subcontractors and submit the contracting or administering agency prior to the award of any subcontract under this contract the subcontractor certification required by these bid conditions.

(Signature of Authorized Representative of Contractor)

CITY OF LOWELL
AFFIRMATIVE ACTION CONTRACT REQUIREMENTS
BIDDERS' CERTIFICATION

The bidder hereby certifies he shall comply with the minority manpower ratio and specific action steps contained in the Appendix EEO attached hereto, including compliance with the minority contractor compliance specified in Section V of said Appendix. The contractor receiving the award of the contract shall be required to obtain from each of its subcontractors and submit to the contracting or administering agency prior to the performance of any work under said contract a certification by said subcontractor, regardless of tier, that it will comply with the minority manpower ratio and specific affirmative action steps contained in the Appendix EEO.

Signature of Bidder

Name of Firm

Title

Date

SECTION 004536

**THE COMMONWEALTH OF MASSACHUSETTS
CITY OF LOWELL
SUPPLEMENTAL EQUAL EMPLOYMENT OPPORTUNITY
ANTI-DISCRIMINATION AND AFFIRMATIVE ACTION PROGRAM**

I. For purposes of this contract, “minority” refers to Asian-Americans, Blacks, Spanish Surnamed Americans, North American Indians, and Cape Verdeans. “Commission” refers to the Massachusetts Commission Against Discrimination.

II. During the performances of this contract, the Contractor and all of (his) Subcontractors (hereinafter collectively referred to as the Contractor), for himself, his assignees, and successors in interest, agree as follows:

1. In connection with the performance of work under this contract, the Contractor shall not discriminate against any employee or applicant for employment because of race, color, religious creed, national origin, age or sex.

The aforesaid provision shall include, but not be limited to, the following: employment upgrading, demotion, or transfer; recruitment advertising; recruitment layoff; termination; rates of pay or other forms compensation; conditions or privileges of employment; and selection for apprenticeship. The Contractor shall post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the Commission setting forth the provisions of the Fair Employment Practices Law of the Commonwealth (M.G.L. Chapter 151B).

2. In connection with the performance of work under this contract, the Contractor, shall undertake in good faith affirmative action measures designed to eliminate any discriminatory barriers in the terms and conditions of employment on the grounds of race, color, religious creed, national origin, age or sex, and to eliminate and remedy any effects of such discrimination in the past. Such affirmative action shall entail positive and aggressive measures to ensure equal opportunity in the areas of hiring, upgrading, demotion or transfer, recruitment, layoff or termination, rate of compensation, and in-service or apprenticeship training programs. This affirmative action shall include all action required to guarantee equal employment opportunity for all persons, regardless of race, color, religious creed, national origin, age or sex.

A purpose of this provision is to ensure to the fullest extent possible an adequate supply of skilled tradesmen for this and future Commonwealth public construction projects.

III. 1. As part of his obligation of remedial action under the foregoing section, the Contractor shall maintain on this project a (not less than) 5% percent ratio of minority

employee man hours to total man hours in each job category including but not limited to bricklayers, carpenters, cement masons, electricians, ironworkers, operating engineers, and those "classes of work" enumerated in Section 44C of Chapter 149 of the Massachusetts General Laws.

2. In the hiring of minority journeymen, apprentices, trainees and advanced trainees, the Contractor shall rely on referrals from a multi-employer affirmative action program approved by the Commission, traditional referral methods utilized by the construction industry, and referrals from agencies, not more than three in number at any one time, designated by the Liaison Committee or the Commission.

IV. 1. At the discretion of the Commission there may be established for the life of this contract a body to be known as the Liaison Committee. The Liaison Committee shall be composed of one representative each from the agency or agencies administering this project, hereinafter called the Administering Agency, the Commission and such other representatives as may be designated by the Commission in conjunction with the administering agency.

2. The Contractor (or his agent, if any, designated by him as the on-site equal, employment opportunity officer) shall recognize the Liaison Committee as an affirmative action body, and shall establish a continuing working relationship with the Liaison Committee on all matters related to minority recruitment, referral, employment and training.

3. The Contractor shall prepare projected manning tables on a quarterly basis. These shall be broken down into projections, by week, or workers required in each trade. Copies shall be furnished one week in advance of the commencement of the period covered, and also when updated, to the Commission and Liaison Committee.

4. Records of employment referral orders, prepared by the Contractor, shall be made available to the Commission and to the Liaison Committee on request.

5. The Contractor shall prepare weekly reports in a form approved by the Commission of hours worked in each trade by each employee, identified as minority or non-minority. Copies of these shall be provided at the end of each such week to the Commission and to the Liaison Committee.

V. If the Contractor shall use any subcontractor on any work performed under this contract, he shall take affirmative action to negotiate with qualified minority subcontractors. This affirmative action shall cover both pre-bid and post-bid periods. It shall include notification to the Office of Minority Business Assistance (within the Executive Office of Communities and Development) or its designee, while bids are in preparation, of all products, work or services for which the Contractor intends to negotiate bids.

VI. 1. In the employment of journeymen, apprentices, trainees and advanced trainees, the Contractor shall give preference, first, to citizens of the Commonwealth who have served in the armed forces of the United States in time of war and have been honorably discharged therefrom or released from active duty therein, and who are qualified to perform the work to which the employment relates, and, secondly, to citizens of the Commonwealth generally, and, if such cannot be obtained in sufficient numbers, then to citizens of the United States.

VII. A designee of the Commission and a designee of the Liaison Committee shall each have right of access to the construction site.

VIII. Compliance with Requirements

The Contractor shall comply with the provisions of Executive Order No. 74, as amended by Executive Order No. 116 dated May 1, 1975, and of Chapter 151B as amended, of the Massachusetts General Laws, both of which are herein incorporated by reference and made a part of this contract.

IX. Non-Discrimination

The Contractor, in the performance of all work after award, and prior to completion of the contract work, will not discriminate on grounds of race, color, religious creed, national origin, age or sex in employment practices, in the selection or retention of subcontractors, or in the procurement of materials and rentals of equipment.

X. Solicitations for Sub-Contracts, and for the Procurement of Materials and Equipment

In all solicitations either by competitive bidding or negotiation made by the Contractor either for work to be performed under a subcontract or for procurement of materials or equipment, each potential subcontractor or supplier shall be notified in writing by the Contractor of the Contractor's obligations under this contract relative to non-discrimination and affirmative action.

XI. Bidders Certification Requirement

1. The bidders certification form currently in use will be deleted from all future bid documents.

2. The following certification statement will be inserted in the bid document just above the bidder's signature, as a substitute for the present bidder certification form: "The bidder hereby certifies he shall comply with the minority manpower ratio and specific action steps contained in the appendix EEO attached hereto, including compliance with the minority contractor compliance specified in Section V of said appendix. The Contractor receiving the award of the contract shall be required to obtain

from each of its subcontractors and submit to the contracting or administering agency prior to the performance of any work under said contract a certification by said subcontractor, regardless of tier, that it will comply with the minority manpower ratio and specific affirmative action steps contained in the appendix EEO.”

XII. Contractor’s Certification

The Contractor’s certification form must be signed by all successful low bidder(s) prior to award by the contracting agency. (See attachment.)

XIII. Compliance-Information, Reports and Sanctions

1. The Contractor will provide all information and reports required by the administering agency or the Commission on instructions issued by either of them and will permit access to its facilities and any books, records, accounts and other sources of information, which may be determined by the Commission to affect the employment of personnel. This provision shall apply only to information pertinent to the Commonwealth’s supplementary affirmative action contract requirements. Where information required is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the administering agency or the Commission as appropriate and shall set forth what efforts he has made to obtain the information.

2. Whenever the administering agency, the Commission, or the Liaison Committee believes the General Contractor or any Subcontractor may not be operating in compliance with the terms of this Section, the Commission directly, or through its designated agent, shall conduct an appropriate investigation, and may confer with the parties, to determine if such Contractor is operating in compliance with the terms of this Section. If the Commission or its agents finds the General Contractor or any subcontractor not in compliance, it shall make a preliminary report on non-compliance, and notify such Contractor in writing of such steps as will in the judgment of the Commission or its agent bring such Contractor into compliance. In the event that such Contractor fails or refuses to fully perform such steps, the Commission shall make a final report of non-compliance, and recommend to the administering agency the imposition of one or more of the sanctions listed below. If, however, the Commission believes the General Contractor or any Subcontractor has taken or is taking every possible measure to achieve compliance, it shall not make a final report of non-compliance. Within fourteen days of the receipt of the recommendations of the Commission, the administering agency shall move to impose one or more of the following sanctions, as it may deem appropriate to attain full and effective enforcement:

a) The recovery by the administering agency from the General Contractor of 1/100 of 1% of the contract award price or \$1000 whichever sum is greater, in the nature of liquidated damages or, if a Subcontractor is in non-compliance, the recovery by the administering agency from the General Contractor to be assessed by the

General Contractor as a back charge against the Subcontractor, of 1/10 of 1% of the subcontract price, or \$400 whichever sum is greater, in the nature of liquidated damages, for each week that such party fails or refuses to comply.

b) The suspension of any payment or part thereof due under the contract until such time as the General Contractor or any Subcontractor is able to demonstrate his compliance with the terms of the contract;

c) The termination, or cancellation, of the contract, in whole or in part, unless the General Contractor or any Subcontractor is able to demonstrate within a specified time his compliance with the terms of the contract;

d) The denial to the General Contractor or any Subcontractor of the right to participate in any future contracts awarded by the administering agency for a period of up to three years.

3. If at any time after the imposition of one or more of the above sanctions a Contractor is able to demonstrate that he is in compliance with this Section, he may request the administering agency, in consultation with the Commission, to suspend the sanctions conditionally, pending a final determination by the Commission as to whether the Contractor is in compliance. Upon final determination of the Commission, the administering agency, based on the recommendation of the Commission, shall either lift the sanctions or reimpose them.

4. Sanctions enumerated under Sections XII-2 shall not be imposed by the administering agency except after an adjudicatory proceeding, as that term is used M.G.L. c. 30A, has been conducted. No investigation by the Commission or its agent shall be initiated without prior notice to the Contractor.

Severability

The provisions of this section are severable, and if any court of competent jurisdiction shall hold any of these provisions unconstitutional, the decision of such court shall not affect or impair any of the remaining provisions.

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SECTION 004537

CITY OF LOWELL

MINORITY BUSINESS ENTERPRISE PROGRAM

I. Statement of Equal Opportunity Policy

WHEREAS: it is the policy of the government of the United States of America, the Commonwealth of Massachusetts and the City of Lowell that no person shall be discriminated against in any manner whatsoever on the grounds of race, religion, color, sex or national origin; and

WHEREAS: it is the policy of the government of the United States of America, the Commonwealth of Massachusetts and the City of Lowell that no person because of race, color, national origin, sex or religion be excluded from participation in, be denied the benefits of or be subjected to discrimination under any program or activity funded entirely or in part by the City, State or Federal government; and

WHEREAS: the City of Lowell unequivocally ascribes to the policies of the State and Federal governments with respect to non-discrimination and equal opportunity and is the recipient of Federal and State financial assistance; and

WHEREAS: to clearly enunciate the equal opportunity/affirmative action policy of the City of Lowell's Minority Business Enterprise Program, the following responsibilities are specified:

(1) The City of Lowell strongly affirms that it will not discriminate in any contractual procedures including, but not limited to, contracts for construction, services, and supplies.

(2) This policy shall be administered at all levels of City government with a positive, aggressive and supportive attitude on the part of all Department Heads. All City Department Heads will be furnished with a copy of the Minority Business Enterprise Program.

(3) It is the responsibility of all Department Heads and employees to take affirmative steps to implement this policy to insure equality of opportunity in conducting the affairs of the City of Lowell, including notifying those persons and businesses doing business with the City of Lowell that contracts for goods and services, and construction shall be made without reference or regard to race, color, sex, age, disability, religion or national origin.

(4) The Contract Compliance/Affirmative Action Officer shall be responsible for insuring that all aspects of the MBE Program are implemented and monitored. This will include active recruitment of MBE's. The Contract Compliance/Affirmative Action Officer will report directly to the City Manager on all MBE matters.

(5) The Contract Compliance/Affirmative Action Officer will conduct pre-bid conferences to inform all potential bidders of the goals of the City's MBE Program.

(6) A copy of the MBE Program will be available for public inspection in the office of the Contract Compliance/Affirmative Action Officer.

NOW, THEREFORE, IT IS HEREBY RESOLVED: that the following Minority Business Enterprise Program be and hereby is adopted for and in behalf of the City of Lowell.

I. Objectives and Goals

(1) For purposes of this MBE Program "minority" refers to a person with permanent residence in the United States and who is Black, Hispanic, American Indian, Eskimo, Aleut, Asian or Cape Verdean.

(2) For purposes of this MBE Program "Minority Business Enterprise" or "MBE" means any business certified by the State Office of Minority Women Business Assistance (SOMWBA) as a bonafide minority business enterprise. To be certified as an MBE, a business must demonstrate:

- a. That minority-persons beneficially own and control at least 51% of the business;
- b. That minority persons have dominant control in the management and operation of the business;
- c. That minority persons have made a substantial investment in the business; and
- d. That the business is an ongoing concern and that it was not created solely for the purpose of taking advantage of set-aside programs.

In the case of a joint venture between a SOMWBA certified MBE and a non-minority controlled enterprise, the joint venture shall be considered to be an MBE if the SOMWBA certified MBE which is part of the joint venture has more than 51% control over management of the project bid upon by the joint venture, and has the right to receive more than 51% of the profits that are derived from that project.

(3) The objective of the City of Lowell's MBE Program is to ensure participation by MBE's in City contracts for goods, services and supplies. This objective is based in part on the availability of MBE's with expertise in these areas. The Contract

Compliance/Affirmative Action Officer will work to identify the needs of the various City Departments for supplies, goods, and services and to match them with available MBE's.

(4) The goal of the City of Lowell's MBE Program shall be the awarding of not less than five percent (5%) of the total dollar value of all contracts for goods, services and supplies to available qualified MBE's.

(5) The City of Lowell will seek to use MBE's certified by the State Office of Minority Women Business Assistance (SOMWBA). The Contract Compliance/Affirmative Action Officer will contact SOMWBA for confirmation of the certification status of MBE's. Uncertified MBE's will be referred to SOMWBA for certification.

III. Responsibility For Implementation

The City's Contract Compliance/Affirmative Action Officer is responsible for the development, implementation and managerial functions of the MBE Program. That person is directly responsible to the City Manager who has overall responsibility for the Program. All City personnel involved in the MBE Program are expected to cooperate fully with the Contract Compliance/Affirmative Action Officer to ensure the success of the Program.

Specific responsibilities of the Contract Compliance/Affirmative Action Officer include:

- (1) Development of monitoring and revising the MBE Program.
- (2) Identifying the supplies, goods and services required by the City through notifications sent to him/her by the various departments responsible for procuring them.
- (3) Maintaining a directory of MBE's with information to include the type of business and area of specialty of each MBE.
- (4) Publicizing business opportunities to MBE's and assisting such business to obtain contracts and subcontracts by providing them with information in sufficient time to prepare bids and quotations.
- (5) Advising MBE's of training opportunities and available technical assistance.
- (6) Conducting pre-bid and pre-construction conferences to explain MBE requirements and to respond to questions.
- (7) Participating on bid and proposal review panels.

- (8) Maintaining accurate and up-to-date records of MBE efforts.
- (9) Monitoring contractors' and subcontractors' compliance with MBE requirements.
- (10) Attending conferences, workshops and training seminars concerning MBE Programs.
- (11) Serving as liaison with economic development organizations working in support of economic development in the minority community.
- (12) Assisting in the arrangement of joint ventures between minority and non-minority firms and two or more minority firms.
- (13) Providing technical assistance to interested MBE's in the area of bidding and bonding, and if necessary, making referrals to other agencies for such assistance.

IV. Implementation of Program

(A) Internal Mechanisms

The procedures that will be utilized by the City of Lowell that will help to ensure that Minority Business Enterprises will have an equitable opportunity to compete for contracts and subcontracts include the following:

- (1) The City will develop bid packages and requests for proposals in such a way as to increase MBE Participation whenever possible. (e.g. breaking large contracts into smaller contracts to enable MBE's to bid).
- (2) The City will encourage the formation of joint ventures among MBE's and also between Minority and Non-Minority firms by having the Contract Compliance Officer serve as the liaison between firms.
- (3) The City will provide specifications and requests for proposals to the Minority entrepreneurial Community in such a timely fashion as to insure that minority bidders will have ample time to formulate a proposal.
- (4) The City will provide notice of bid specifications and requests for proposals to the State Office of Minority Women Business Assistance not less than fifteen (15) days in advance of the bid or proposal advertisement.
- (5) The City will utilize bid forms that will be as simplified as possible.

(6) The Contract Compliance Officer will hold pre-bid conferences to emphasize the City's commitment to the MBE program and to explain the goals and objectives of the City's MBE program and also to explain the forms that must be submitted with the bid regarding the MBE participation.

(7) The City will make available to and assist bidders in the use of the MBE directory.

(8) The Department of Public Works will request that all contractors submit monthly reports regarding their use of minority services.

(9) The City of Lowell will seek to make MBE's aware of future projects to be undertaken through its outreach program.

(10) The Contract Compliance Officer, with the assistance of the State Office of Minority Women Business Assistance, will regularly update the MBE Directory.

(B) External Mechanisms

In order for MBE's to be aware of the City of Lowell's procurement and construction activities, the Contract Compliance Officer will:

(1) Forward copies of all bid notices, including date contract was advertised, to the State Office of Minority Women Business Assistance, and other Minority Business Associations.

(2) Place bid notices in all local newspapers, the Dodge Bulletin, MBE trade association newsletters and minority newspapers.

(3) Include Minority Business Enterprise clause in all advertisement for bids.

(4) Hold pre-bid conferences for potential bidders to provide an opportunity to explain MBE requirements.

(5) Seek to obtain the maximum utilization of SOMWBA Certified Contractors, vendors and services.

(6) Conduct a seminar with all City of Lowell Department Heads for the purpose of identifying their respective duties and responsibilities to accomplish the affirmative action goals of the City.

(7) Outreach minorities who provide professional services such as architects, engineers, consultants, accountants, attorneys, etc. through notices to professional organizations and utilization of listing provided by SOMWBA.

V. Bidding Procedures

COMPETITIVE BIDDING

The City of Lowell, in awarding contracts, uses the procedure set out in Chapter 43, Section 18 of the Massachusetts General Laws. All contracts for construction or for the purchase of equipment, supplies or materials, which amount to two thousand dollars or more are awarded after proposals are solicited through advertisements in the central register published by the state secretary and in at least one newspaper published in the City of Lowell. All proposals are opened in public. Contracts are awarded to the lowest responsible bidder meeting the plans and specifications of proposed work or supplies.

PURCHASES OF LESS THAN \$2,000.00

When purchasing supplies totaling less than \$2,000.00 the Purchasing Department of the City of Lowell contracts at least three firms to obtain prices for the required goods. The firm quoting the lowest price is then generally used, based on its past performance and ability to provide quality supplies.

REQUESTS FOR PROPOSALS

The City of Lowell utilizes RFP's for consultant, engineering, design, etc. services. The procedure that has been used is that the Office of the City Manager, distributes copies of an RFP to firms who have completed similar projects (whether or not for the City of Lowell), those listed in trade/professional journals, and those who have expressed an interest in receiving particular RFP's. The selection of a firm for a project is based on its past performance on similar projects, the content of its proposal and consideration of the City's overall needs and project justification. Project cost is only one factor taken into consideration in the awarding of such projects.

The City of Lowell will make every effort to outreach to MBE's to ensure them an opportunity to participate in each of the above procedures, as outlined in Section IV above.

VI. Monitoring and Reporting Procedure

In addition to the established reporting requirements for Affirmative Action, quarterly reports will be developed and documented by the Contract Compliance Officer, and will include the following information for each project:

(1) Name of General/Prime Contractor and Subcontractor awarded City funded contracts.

(2) Description, dollar value, and percentage of dollar value of contracts awarded to MBE's by the City.

(3) Description, dollar value, and percentage of dollar value of subcontracts, regardless of tier, awarded to MBE's by the City.

(4) Total percentage at dollar value of all contracts and subcontracts, regardless of tier, awarded to MBE's and an indication as to whether the percentage met or exceeded the goal specified in the project application.

The Contract Compliance Officer will also require that each Contractor employed by the City of Lowell, submit to her/him monthly reports consisting of a complete breakdown of all minority services employed during each week of construction.

The monthly and quarterly reports will be kept on file with the Contract Compliance Officer and will be forwarded to the Massachusetts Commission Against Discrimination and the State Office of Minority Women Business Assistance and HUD.

The Contract Compliance Officer shall be responsible for insuring that all aspects of the City of Lowell's Minority Business Enterprise Program are initiated and undertaken. By virtue of the delegation of this responsibility and authority to direct the program, the Contract Compliance Officer will report directly to the Office of the City Manager on equal opportunity matters. The Contract Compliance Officer shall be responsible for the development, administration and monitoring of all activities necessary to insure the accomplishment and success of this Minority Business Enterprise Program. This includes a close working relationship with the Department of Public Works and the Engineering Office for the City of Lowell.

The Contract Compliance Officer will forward all monthly monitoring reports from the Contractor to the State Office of Minority Women Business Assistance on a quarterly basis.

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SECTION 004548

STATEMENT OF TAX COMPLIANCE

Pursuant to Massachusetts General Laws Chapter 62C, Section 49A I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes required under law.

Signature of Individual or Corporate Name

Social Security Number
or Federal Identification Number

By: _____
Corporation Officer's Name

Date: _____, 2015

Corporate Officer's Title

Approval of a contract or other agreement will not be granted unless this certification clause is signed by the applicant.

Your Social Security number will be furnished to the Massachusetts Department of Revenue to determine whether you have met tax filing or tax payment obligations. Providers who fail to correct their non-filing or delinquency will not have a contract or other agreement issued, renewed, or extended.

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SECTION 004549

DEBARMENT DISCLOSURE FORM

PUBLIC CONTRACTS – DEBARMENT

The said undersigned certifies under the pains and penalties of perjury that the said undersigned is not presently debarred from doing public construction work or from contracting or subcontracting with the Commonwealth of Massachusetts under the provisions of Section 29F of Chapter 29 of the Massachusetts General Laws, or any Rule or Regulation promulgated thereunder, nor is the said undersigned presently debarred from entering into contracts for the furnishing of supplies or services to any public agency, and/or any Federal Regulations.

Date: _____

Name of Bidder: _____

By: _____

Print Name & Title of authorized person signing

Address

City, State, ZIP

****THIS FORM MUST BE SIGNED & RETURNED WITH YOUR BID OFFER.****

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CONTRACT

THIS AGREEMENT, made this the _____ day of _____,

20____, by and between the City of Lowell, Massachusetts acting herein through its City Manager, hereinafter called "OWNER" and

*(1)_____

an individual doing business as, a partnership, a corporation of the _____

hereinafter called "Contractor".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the construction of Contract described as follows: Replacement Windows and Repairs hereinafter called the Project for the sum of

_____ Dollars (\$)_____

and all extra work in connection therewith, under the terms as stated in the General and Special Conditions of the Contract; and at his/her (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance and other accessories and services necessary to complete the said Project in accordance with the conditions and prices stated in the Proposal, the General and Special Conditions of the Contract, the Plans, which include all maps, plates, blue prints, and other drawings and printed or written explanatory matter thereof, the Specifications and contract documents therefore as prepared by for the City of Lowell by Walker Restoration Consultants herein entitled "Engineer", and as herein enumerated all of which are made a part hereof and collectively evidence and constitute the contract.

The Contractor hereby agrees to commence work under this Contract on or before a date to be specified in a written "Notice to Proceed" of the OWNER and to fully complete the project within 60 consecutive calendar days thereafter.

The OWNER agrees to pay the CONTRACTOR in current funds for the performance of the Contract, subject to additions and deductions, as provided in the General Conditions of the Contract, and to make payments on account thereof as provided in Paragraph 25, "Progress Payments", of the General Conditions.

IN WITNESS WHEREOF, the parties to these presents have executed this Contract in five (5) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

ATTEST:

Secretary CITY OF LOWELL, MASSACHUSETTS

Witness BY _____
City Manager, Kevin J. Murphy

Secretary _____
Contractor

BY _____
Witness

Address

APPROVED AS TO FORM

City Solicitor BY _____
Chief Procurement Officer

APPROVED AS TO AVAILABILITY OF FUNDS

City Auditor

(1) Strike out inapplicable terms. Secretary of the OWNER should attest. If Contractor is corporation, Secretary should attest. Give proper title of each person executing Contract.

AGREEMENT

005000 - 2

CONTRACT

CERTIFICATE OF OWNER'S ATTORNEY

I, the undersigned _____

the duly authorized and acting legal representative, of the City of Lowell, Massachusetts,
do hereby certify as follows:

I have examined the foregoing Contract and surety bonds and the manner of execution thereof, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representatives have full power and authority to execute said agreements on behalf of the respective parties named thereon; and that the foregoing agreements constitute valid and legally binding obligations and provisions thereof.

Date: _____

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**SECTION 006113.13
PERFORMANCE BOND
GENERAL CONTRACTOR**

KNOW ALL MEN BY THESE PRESENTS:

That we, _____ as Principal

And _____, as Surety, are

held and firmly bound unto the City of Lowell, as Obligee, in the sum of _____ dollars (\$ _____), to be paid to the Obligee for which payments, well and truly to be made, we bind ourselves, our respective heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has made a contract with the Obligee, bearing the date of _____ 2015, for the repair and restoration of _____ in Lowell, MA.

NOW, the condition of this obligation is such that if the Principal and all Subcontractors under said contract shall well and truly keep and perform all the undertakings, covenants, agreement, terms and conditions of said contract on its part to be kept and performed during the original term of said contract and any extensions thereof that may be granted by the Obligee, with or without notice to the Surety, and during the life and any guarantee required under the contract, and shall also well and truly keep and perform all the undertakings, covenants, agreements, terms and conditions of any and all duly authorized modifications, alterations changes or additions to said contract that may hereafter be made, notice to the Surety of such modifications, alterations, changes or additions being hereby waived, then this obligation shall become null and void; otherwise, it shall remain in full force and virtue.

IN THE EVENT, that the contract is abandoned by the Principal, or in the event that the Obligee, under the provisions of Article 14 of the General Conditions of said contract terminates the employment of the Principal or the authority of the Principal to continue the work, said Surety hereby further agrees that said Surety shall, if requested in writing by the Obligee, take such action as is necessary to complete said contract.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, the Principal and Surety have hereto set their hands and seals this

_____ day of _____, 2015

PRINCIPAL

SURETY

(Name & Seal)

(Attorney-in-Fact) (Seal)

Attest: _____

Attest: _____

The total premium for this bond is \$ _____

The rate for this bond is _____ % for the first \$ _____ and _____ % for the next \$ _____.

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SECTION 006113.19

FORM OF SUBCONTRACTOR'S PERFORMANCE AND PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, That we, _____
_____ as Principal, hereinafter called Subcontractor, and
_____ as Surety, are held and
firmly bound unto _____ as Obligee, hereinafter
called General Contractor, in the amount of _____ Dollars (\$ _____)
lawful money of the United States of America, and for the payment of which we jointly and severally bind
ourselves, our successors and assigns, firmly by these presents.

WHEREAS THE SAID SUBCONTRACTOR entered into a certain subcontract with the said
General Contractor bearing date of the ____ day of _____, 2015, for: _____

_____ which
contract is by reference made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THE CONDITION OF THIS OBLIGATION is such that if the subcontractor shall faithfully
perform the subcontract and shall indemnify and hold harmless the General Contractor and the surety or
sureties under the labor and materials or payment bond furnished by such General Contractor to the awarding
authority against (1) any and all loss and expense arising out of any and all claims in connection with the
performance of said subcontract which would be required to be paid under the labor and materials or payment
bond furnished by the General Contractor to the awarding authority and (2) attorney's fees in the event the
subcontractor after notice, fails to assume the defense of and defend such claims, then this obligation shall be
null and void; otherwise it shall remain in full force and virtue.

IN WITNESS WHEREOF WE, hereunto set our hands and seals this ____ day of _____, 2015

ATTEST

PRINCIPAL (SEAL)

ATTEST

SURETY (SEAL)

BY: ATTORNEY-IN-FACT

The total premium for this bond is \$ _____

The rate for this bond is _____ % for the first \$ _____ and _____ % for the balance.

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**SECTION 007000
GENERAL TERMS AND CONDITIONS OF THE CONTRACT
CITY OF LOWELL**

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GENERAL TERMS AND CONDITIONS OF THE CONTRACT CITY OF LOWELL

ARTICLE 1 DEFINITIONS

1.1. In General.

1.1.1. Well-known meanings. When words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents, such words or phrases shall be interpreted in accordance with that meaning, unless otherwise stated.

1.1.2. Capitalization. The words and terms defined in this Article are capitalized in these General Terms and Conditions of the Contract. Other capitalized words may refer to a specific document found in the Contract Documents.

1.1.3. Persons. Whenever the word person or persons is used, it includes, unless otherwise stated, entity or entities, respectively, including, but not limited to, corporations, partnerships, and joint venturers.

1.1.4. Singular and Plural. The following terms have the meanings indicated which are applicable to both the singular and the plural thereof.

1.2. Definitions.

1.2.1. Agreement-The Agreement is the written document between the **City** and the **Contractor** which is titled: Agreement between the City of Lowell and the Contractor, which is the executed portion of the Contract, and which forms a part of the Contract. The Agreement also includes all documents required to be attached thereto, including, but not limited to, the performance bond, the labor and materials or payment bonds, certificates of insurance, and all Modifications of the Agreement.

1.2.2. Architect-The **Architect** is the person lawfully licensed to practice architecture and has been selected by the **City** to administer the Contract and named in the Agreement. The term "**Architect**," while referred to in the singular, means the **Architect** and/or the **Architect's** representative.

1.2.3. Change Order-A Change Order is a document which is signed by the **Contractor**, the **Architect**, and the **City**; which is directed to the **Contractor**; which authorizes the **Contractor** to make an addition to, a deletion from or a revision in the Work, or an adjustment in the Contract Sum or in the Contract Time; and which is issued on or after the date of the Agreement between the **Contractor** and the **City**.

1.2.4. City - The **City** refers to the City of Lowell, which is the owner of the Project and is the public awarding authority with whom the **Contractor** has entered into the Contract and for whom the Work is to be provided.

1.2.5. Claim - A Claim is a dispute, demand, or assertion by one of the parties arising out of or relating to the Contract for which such party is seeking relief.

1.2.6. Contract -The Contract consists of all the Contract Documents. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification to the Contract signed by both parties.

1.2.7. Contract Documents-The Contract Documents consist of the Agreement; the notice of award of the Contract; the Notice to Proceed; the entire Project Manual; Change Orders; Work Change Directives;

the **Contractor's** Bid and all accompanying documents accepted by the City; and the **Architect's** written interpretations and clarifications issued on or after the issuance of the Notice to Proceed. Shop Drawing submittals and reports or drawings utilized by the **Architect** in preparing the Contract Documents are not Contract Documents.

1.2.8. Contractor - The **Contractor** is the person who is awarded the Contract for the Project herein pursuant to , inclusive, and is identified in the Agreement as such. The term "**Contractor**" is intended to include the **Contractor** as well as its authorized representative(s).

1.2.9. Contract Sum-The Contract Sum is the total amount stated in the Agreement payable by the **City** to the **Contractor** for the completion of the Work in accordance with the Contract Documents.

1.2.10. Contract Time-Unless otherwise provided, the Contract Time is the number of days allotted in the Contract Documents or the dates stated in the Agreement, including authorized adjustments, for Substantial Completion.

1.2.11. Coordination Drawings-Coordination Drawings are those drawings which are prepared by the **Contractor** or a Subcontractor which show the exact alignment, physical locations, and configuration of the plumbing, fire protection, mechanical, electrical, security, and technology installations in relation to both new and existing architectural and structural elements.

1.2.12. Day - The term "day" shall mean calendar day unless otherwise stated.

1.2.13. Field Order- A Field Order is a written order issued by the **Architect** which orders minor changes in the Work, but which does not involve a change in the Contract Sum or the Contract Time.

1.2.14. Filed Subcontractor-A Filed Subcontractor is a person that files a sub-bid pursuant to M.G.L. c.149 §44F and receives a subcontract as a result of that filed sub-bid.

1.2.15. Final Completion-Final Completion is the point in time when the Architect finds that the Work has been fully completed in accordance with the Contract Documents. Final Completion shall be no later than thirty (30) days after Substantial Completion.

1.2.16. General Requirements-General Requirements refer to Sections of Division 1 of the Specifications.

1.2.17. Modification - A Modification is a written instrument which amends the Contract after execution of the Agreement.

1.2.18. Notice to Proceed-A Notice to Proceed is a written notice given by the **City**, or the **Architect**, to the **Contractor** fixing the date on which the Contract Time will begin to run and on which the **Contractor** shall start to perform its obligations under the Contract Documents.

1.2.19. Drawings - The Drawings are the drawings which are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location, dimensions, scope, extent, and character of the Work to be furnished and performed by the **Contractor** and which have been prepared or approved by the **Architect**.

1.2.20. Product Data-Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the General **Contractor** to illustrate materials or equipment for some portion of the Work. Product Data are not considered part of the Contract Documents.

1.2.21. Project - The Project is the total Work to be provided under the Contract that may be the whole or a part of the Project as indicated elsewhere in the Contract Documents and may include construction by

the **City** or by separate contractors. The Project is the Work described in the invitation to bid (advertisement) and Specifications, and illustrated by the Drawings, including Modifications.

1.2.22. Project Manual-The Project Manual is the entire set of bidding documents which includes, but is not limited to, the invitation to bid (advertisement), the instructions to bidders, all of the forms, the wage rates, all City and state requirements, the General Terms and Conditions of the Contract, any supplementary conditions thereto, the Drawings, the Specifications, and all addenda.

1.2.23. Proposed Change Order-A Proposed Change Order is a Change Order that has been submitted by the **Contractor** to the **Architect**, is under review, and has not been approved by the **City**.

1.2.24. Samples - Samples are physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged. Samples are not considered part of the Contract Documents.

1.2.25. Shop Drawings-Shop Drawings are all drawings, diagrams, illustrations, schedules, and other information which are specifically prepared or assembled by or for the **Contractor** and submitted by the **Contractor** to illustrate some portion of the Work. Shop Drawings are not considered part of the Contract Documents.

1.2.26. Site - The Site is the location of the Project and of the Work.

1.2.27. Specifications - Specifications are those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

1.2.28. Subcontractor - A Subcontractor is a person who contracts directly with the **Contractor** and which includes Filed Subcontractors, unless otherwise stated.

1.2.29. Submittals - Submittals are those Shop Drawings, Product Data, Samples, or any other required document which are provided to the Architect for review and approval.

1.2.30. Substantial Completion-Substantial Completion means that the Work has been completed and the Site or the facility is opened to public use, except for minor incomplete or unsatisfactory items that do not materially impair the usefulness of the Work. The **Architect** shall decide what constitutes "minor," "incomplete," "unsatisfactory," and "materially" and the **Architect's** decision shall be final.

1.2.31. Sub-subcontractor-A Sub-subcontractor is a person who has contracted directly with a Subcontractor.

1.2.32. Supplier-A Supplier is a manufacturer, fabricator, distributor, material person, or vendor having a direct contract with the Contractor or with any Subcontractor to furnish materials or equipment to be incorporated into the Work by the Contractor or any Subcontractor.

1.2.33. Work-Work refers to the services and the entire completed construction or the various separately identifiable parts thereof required by the Contract Documents, including all labor, materials, and equipment furnished, furnished and incorporated into the Project, or to be provided by the **Contractor** to fulfill the **Contractor's** obligations. The Work may constitute the whole or a part of the Project.

1.2.34. Work Change Directive-A Work Change Directive is a written directive to the **Contractor** ordering an addition to, a deletion from, or a revision to the Work issued on or after the date of the Agreement, signed by the **City**, and recommended by the **Architect**.

ARTICLE 2 ABOUT THE CONTRACT DOCUMENTS

2.1. Priority/Conflict

2.1.1 Priority Among Contract Documents. In the event of conflict among the Contract Documents, the Contract Documents shall be construed according to the following priorities:

Highest Priority:	Modifications
Second Priority:	Agreement
Third Priority:	Addenda-later date to take precedence
Fourth Priority:	Supplementary General Conditions
Fifth Priority:	General Conditions
Sixth Priority:	Drawings and Specifications

2.1.1.1. If there is a conflict within the Drawings, the figured dimensions shall govern over the scaled dimensions. Detailed Drawings shall govern over the general Drawings. Larger scale Drawings shall take precedence over smaller scale Drawings. Drawings shall govern over Shop Drawings. Whenever there is a conflict concerning quality or quantity between or among notes, specifications, dimensions, details, or schedules in the Specifications or in the Drawings, or between the Specifications and the Drawings, or in all other instances not specifically noted above, the **Contractor** shall provide, unless otherwise directed by a Modification of the Contract, the better quality or greater quantity of Work at no increase in the Contract Sum or in the Contract Time.

Compliance with these priority conditions shall not justify any changes in the Work or any increase in the Contract Sum or Contract Time, unless any such compliance results in work that may not be reasonably inferred from the Contract Documents as being required to produce the intended result as determined by the **Architect**.

2.1.2 Review of the Contract Documents and Field Conditions and Discovery of Conflict, Error, Ambiguity, or Discrepancy. Before starting the Work, and during the progress thereof, the **Contractor** shall carefully study and compare the Contract Documents with each other and with the information furnished by the **City** pursuant to Article 3 and shall at once report to the **Architect** any error, inconsistency, or omission the **Contractor** may discover. Any necessary change shall be ordered as provided in Article 11, subject to the requirements of any other provisions of the Contract Documents. The **Contractor** shall not proceed with the Work affected thereby (except in an emergency) until a Modification has been issued. If the **Contractor** proceeds with the Work having discovered such errors, inconsistencies, or omissions contrary to the provisions contained herein, or if by reasonable study of the Contract Documents the **Contractor** could have discovered such, the **Contractor** shall bear all costs arising therefrom. The **Contractor** shall be liable to the **City** for failure to report any conflict, error, ambiguity, or discrepancy of which it knew or should have known.

2.1.3 Field Measurements. The **Contractor** shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the **Contractor** with the Contract Documents before commencing activities. Errors, inconsistencies, or omissions discovered shall be reported to the **Architect** at once.

2.1.4 Statutory Provisions. The **City** and the **Contractor** recognize that other rights duties and obligations with respect to public construction contracts are provided for by statute, notwithstanding the fact that they may not be provided for in the Contract Documents. In case of conflict between the statutory provisions and other provisions of the Contract Documents, the statutory provisions shall govern.

2.1.5. Voided or Unlawful Provisions. In the event any provision in the Contract is voided or deemed unlawful, such provision shall be deleted without affecting the remainder of the Contract.

2.2. Execution.

2.2.1. Execution of the Agreement by the **Contractor** is a representation that the **Contractor** has visited the Site, become familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

2.3. Intent.

2.3.1. Entire Agreement. The Contract Documents comprise the entire agreement between the **City** and the **Contractor** concerning the Work. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the **Contractor**. The Contract Documents are complementary; what is required by one shall be as binding as if required by all. Performance by the **Contractor** shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. All Work mentioned or indicated in the Contract Documents shall be performed by the **Contractor** as part of this Contract unless it is specifically indicated in the Contract Documents that such Work is to be done by others.

2.3.2. Statutory Provisions Each and every provision of law, code, and regulation, required by law to be inserted in these Contract Documents shall be deemed to be inserted herein, and they shall be read and enforced as though it were included herein, and if through mistake or otherwise, any such provision is not inserted, or if not correctly inserted, then upon the application of either party, the Contract Documents shall forthwith be physically amended to make such insertion.

2.3.3. Functionally Complete Project. It is the intent of the Contract Documents to describe a functionally complete Project. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the **Contractor**. Any Work, materials, or equipment that may be reasonably inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed by the **Contractor** whether or not specifically called for in the Contract Documents.

2.3.4. Indications or Notations. All indications or notations which apply to one of a number of similar situations, materials, or processes shall be deemed to apply to all such situations, materials, or processes wherever they appear in the Work, except where a contrary result is clearly indicated by the Contract Documents.

2.3.5. Standards or Quality of Materials of Workmanship. Where no explicit quality or standards for materials or workmanship are established for work, such work is to be of good quality for the intended use and consistent with the quality of the surrounding Work and of the construction of the Project generally.

2.3.6. Manufactured Projects. All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the manufacturer's written or printed directions and instructions unless otherwise indicated in the Contract Documents.

2.3.7. Mechanical, Electrical, Plumbing, Security, Technology, and Fire Protection Drawings. The mechanical, electrical, plumbing, security, technology, and fire protection Drawings are diagrammatic only and are not intended to show the alignment, physical locations, or configurations of such Work. Such Work shall be installed without additional cost to the **City** to clear all obstructions, permit proper clearances for the Work of other trades, and present an orderly appearance where exposed. Prior to beginning such Work, the **Contractor** shall prepare Coordination Drawings and demonstrate to the **Architect's** satisfaction that the installations will comply with the preceding sentence. The **Contractor** shall be responsible to conduct coordination meetings with the Subcontractors as necessary to prepare Coordination Drawings. The **Contractor** shall be solely liable and responsible for any costs and/or delays resulting from the **Contractor's** failure to prepare such Coordination Drawings.

2.3.8. Locations of Fixtures and Outlets. Exact locations of fixtures and outlets shall be obtained from the **Architect** as provided in Article 5 before the Work is roughed in. Work installed without such information from the **Architect** shall be relocated at the **Contractor's** expense.

2.3.9. Tests. When test boring or soil test information are included with the Contract Documents or otherwise made available to the **Contractor** and such test boring or soil test information was obtained by the **City** for use by the **Architect** in the design of the Project or Work, the **City** does not hold out such information to the **Contractor** as an accurate or approximate indication of subsurface conditions, and no claim for extra cost or extension of time resulting from a reliance by the **Contractor** on such information shall be allowed except as otherwise provided herein. Any such reports are not part of the Contract Documents.

2.3.10. Joining Work. Where the Work is to fit with existing conditions or work to be performed by others, the **Contractor** shall fully and completely join the Work with such conditions or work, unless otherwise specified.

2.4. Organization.

2.4.1. The organization of the Specifications into divisions, sections, and articles, and the arrangement of Drawings shall not control the **Contractor** in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

2.5. References.

2.5.1. Where codes, manuals, specifications, standards, requirements and publications of public and private bodies are referred to in the Contract Documents whether specifically or by implication, references shall be understood to be to the latest revision prior to the date of receiving bids, except where otherwise indicated. Where statutes are referred to in the Contract Documents whether specifically or by implication, references shall be understood to be to the latest revision.

2.5.2. References herein to particular paragraphs or Articles are solely to facilitate finding additional information with regard to the specific matters and are not to be construed in any way as limiting the possible paragraphs and Articles in which such matters may be found elsewhere in this document.

2.6. Reuse of Architect's Written Instruments.

2.6.1. Neither the **Contractor** nor any Subcontractor or Supplier shall have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents prepared by the **Architect** and shall not reuse any of such Drawings, Specifications, or other documents without prior written consent of the **City** and the **Architect**.

2.7. Written Material of the Contractor.

2.7.1. All written material prepared or collected by the **Contractor** in the course of completing the Work shall be the exclusive property of the **City** and shall not be used by the **Contractor** for any purpose other than the purpose of this Contract.

2.8. Modifying Words.

2.8.1. In the interest of simplicity, modifying words such as "all" and "any" may be omitted, but the fact that such words may be absent from one sentence and appear in another is not intended to affect the interpretation of either statement.

2.9 Use of Certain Words and Terms.

2.9.1 Whenever in the Contract Documents the terms “as ordered,” “as directed,” “as required,” “as allowed,” “as approved,” or terms of like effect or import are used, or the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe a requirement, direction, review, or judgment of the **City** or of the **Architect** as to the Work, it is intended that such requirement, direction, review, or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise).

2.9.2. The use of any such term or adjective shall not be effective to change the duties and responsibilities of the **City** or the **Architect** from those assigned in the Contract Documents or to assign any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of the Contract Documents.

2.9.3. When the words “Contractor,” “Subcontractor,” “Sub-subcontractor,” and “Supplier” are used, they are intended to include their employees and agents, unless otherwise specified.

2.10 Modification of the Contract Documents.

2.10.1. Major Modifications. Major Modifications may affect the Contract Sum or the Contract Time. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways, all of which must contain a written endorsement by the **City**:

2.10.1.1. a formal written amendment;

2.10.1.2. a Change Order;

2.10.1.3. a Work Change Directive; or

2.10.1.4. the **Architect's** written interpretation, clarification, or decision.

2.10.2. Minor Modifications. Minor modifications do not affect the Contract Sum or the Contract Time. The requirements of the Contract Documents may be supplemented and minor variations and deviations of the Work may be authorized in one or more of the following ways:

2.10.2.1. a Field Order; or

2.10.2.2. the **Architect's** approval of a Shop Drawing or Sample.

ARTICLE 3 THE CITY

3.1. Signatory.

3.1.1. All documents which require a signature or an endorsement by the **City** must be signed by the City Manager in order to be deemed ratified by the **City**.

3.2. Requirements to Provide Documents.

3.2.1. To the extent they are available, the **City** shall furnish surveys describing physical characteristics, legal limitations, and utility locations for the site of the Project, and a legal description of the Site.

3.2.2. The **City** shall obtain and pay for necessary approvals, easements, assessments, and charges which are customarily secured prior to the execution of the Contract.

3.2.3. The **City** shall furnish information or services required of the **City** hereunder with reasonable promptness after receipt from the **Contractor** of a written request for such information or services.

3.2.4. The **City** shall provide the **Contractor**, at no charge, such copies of the Project Manual as are reasonably necessary for the execution of the Work.

3.3. Clerk of the Works.

3.3.1. The **City** may engage a Clerk of the Works for this Project, in which case the **City** shall, upon request of the **Contractor**, provide the **Contractor** with a written statement of the duties, responsibilities, and limitations of authority of such Clerk of the Works. Except as expressly set forth in such written statement, the Clerk of the Works shall have no authority to approve Work, to approve Change Orders, or to exercise any of the power and authority of the **City** or the **Architect**. The Clerk of the Works shall have access to all areas of the Project at all times. The **Contractor** shall fully cooperate with the Clerk of the Works in the performance of the Clerk's duties.

3.4. City's Right to Perform Construction and to Award Separate Contracts.

3.4.1. The **City** reserves the right to perform construction or operations at the Site with its own forces or others. If the **Contractor** claims that a delay or additional cost is involved because of such action by the **City**, the **Contractor** shall make such Claim as provided elsewhere in the Contract Documents.

3.4.2. When the separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "**Contractor**" in the Contract Documents in each case shall mean the **Contractor** who executes each separate City-Contractor Agreement.

3.4.3. The **City** shall provide for coordination of the activities of the **City's** own forces and of each separate contractor with the Work of the **Contractor**, who shall cooperate with them. The **Contractor** shall afford each other person access to the Site and shall properly coordinate its Work with that of the persons performing other work. The **Contractor** shall participate with other separate contractors and the **City** in reviewing their construction schedules when directed to do so. The **Contractor** shall make any revisions to the construction schedules deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the **Contractor**, separate contractors, and the **City** until subsequently revised.

3.5. Limitations on the City's Responsibilities.

3.5.1. The **City** shall not supervise, direct, or have control or authority over, nor be responsible for the **Contractor's** means, methods, techniques, sequences, or procedures of construction or the safety precautions and programs incident thereto, or for any failure of the **Contractor** to comply with laws, codes and regulations applicable to the furnishing or performance of the Work. The **City** will not be responsible for the **Contractor's** failure to perform or furnish the Work in accordance with the Contract Documents. The **City** is not responsible for the acts or omissions of the **Contractor**, any Subcontractor, Supplier, or anyone for whose acts the **Contractor**, any Subcontractor or Suppliers may be liable.

3.5.2. The **City's** authority to review any of the **Contractor's** progress schedules, or its decision to raise or not to raise any objections about such schedules shall not impose on the **City** any responsibility for the timing, planning, scheduling, or execution of the Work, nor in any way give rise to any duty or responsibility on the part of the **City** to exercise this authority for the benefit of the **Contractor**, any Subcontractor or Supplier or any other party.

3.5.3. The **City's** decision to raise or not to raise objections with regard to any aspects of the **Contractor's** insurance shall in no way give rise to any duty or responsibility on the part of the **City** to or for the benefit of the **Contractor**, any Subcontractor, any Supplier, or any other party.

3.6. Reservation of Rights.

3.6.1. The **City** reserves the right to correct at any time any error in any progress payment that may have been made.

3.6.2. Should defective Work be discovered subsequent to final payment, the **City** reserves the right to make a claim and recover all costs and professional fees associated therewith, including the cost of removing and/or replacing the defective Work.

3.7. Waivers.

3.7.1. All waivers by the **City** are valid only to the extent that they are signed by the **City**. Any such waivers pertain only to the specific matter contained in the waiver and not to any similar, subsequent matters.

ARTICLE 4 THE ARCHITECT

4.1 City's Representative.

4.1.1. The **Architect** is the **City's** representative (1) during construction, (2) until final payment is due, and (3) with the **City's** concurrence, from time to time during the correction period described in Article 10. The **Architect** will advise and consult with the **City**. The **Architect** will have authority to act on behalf of the **City** only to the extent provided in the Contract Documents, unless otherwise modified by a written instrument in accordance with other provisions of the Contract.

4.1.2. The duties, responsibilities, and the limitations of authority of the **Architect** as the **City's** representative during construction are set forth in the Contract Documents and shall not be extended without the written consent of the **City** and the **Architect**.

4.2. Administration of the Contract.

4.2.1. The **Architect** will provide administration of the Contract as described in the Contract Documents, unless the **City** has engaged a construction manager.

4.3. Visits to the Site.

4.3.1. The **Architect** will visit the site at intervals appropriate to the stage of construction to become generally familiar with the progress and quality of the completed Work and to determine in general if the Work is being performed in a manner indicating that the Work, when completed, will be in accordance with the Contract Documents. However, the **Architect** will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of on-site observations as an architect, the **Architect** will keep the **City** informed of progress of the Work in writing and will endeavor to guard the **City** against defects and deficiencies in the Work.

4.4. Communications Facilitating Contract Administration

4.4.1. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the **City** and the **Contractor** shall endeavor to communicate through the **Architect**. Communications by and with the **Architect's** consultants shall be through the **Architect**. Communications by and with Subcontractors and Suppliers shall be through the **Contractor**. Communications by and with **City** employees and separate contractors shall be through the **City**.

4.4.2. When it deems it necessary or expedient, the **City** may communicate directly with the **Contractor**, any Subcontractors, Suppliers, or consultants.

4.5. Certification of Applications for Payment.

4.5.1. Based on the **Architect's** observations and evaluations of the **Contractor's** applications for payment, the **Architect** will review and certify the amounts due the **Contractor** and will issue certificates for payment in such amounts.

4.6. Rejection of Work.

4.6.1. The **Architect** will have authority to reject or disapprove Work which (1) does not conform to the Contract Documents; (2) which the **Architect** believes to be defective; and (3) the **Architect** believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Whenever the **Architect** considers it necessary or advisable for implementation of the intent of the Contract Documents, the **Architect** will have authority to require additional inspection or testing of the Work in accordance with Article 9, whether or not such Work is fabricated, installed, or completed. However, neither this authority of the **Architect** nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the **Architect** to the **Contractor**, Subcontractors, Suppliers, or other persons performing portions of the Work.

4.7. Review of Submittals.

4.7.1. The **Architect** will review or take other appropriate action upon the **Contractor's** submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents and only to the extent which the **Architect** believes desirable to protect the **City's** interest. The **Architect's** action will be taken with reasonable promptness, while allowing sufficient time in the **Architect's** professional judgment to permit adequate review, taking into account the time periods set forth in the latest schedule prepared by the **Contractor** and approved by the **Architect**. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the **Contractor** as required by the Contract Documents. The **Architect's** review of the **Contractor's** submittals shall not relieve the **Contractor** of the obligations under Article 5. The **Architect's** review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The **Architect's** approval of a specific item shall not indicate approval of an assembly of which the item is a component.

4.8. Preparation of Change Orders and Work Change Directives.

4.8.1. The **Architect** will prepare Change Orders and Work Change Directives and may authorize minor Modifications in the Work as provided in Article 11.

4.9. Inspections.

4.9.1. The **Architect** will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; will receive and forward to the **City** for the **City's** review and records written warranties and related documents required by the Contract and assembled by the **Contractor**; and will issue a final certificate for payment upon the **Contractor's** compliance with all of the requirements of the Contract Documents.

4.10. Interpretations, Clarifications, and Decisions.

4.10.1. The **Architect** will interpret and decide matters concerning performance under and requirements of the Contract Documents on written request of either the **City** or the **Contractor**. The **Architect's** response to such requests will be made with reasonable promptness and within the time set forth in the

Agreement between the **City** and the **Architect**. Any such written interpretations, clarifications, and decisions shall be binding on the Contractor.

4.10.2. Interpretations, clarifications, and decisions of the **Architect** will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. The **Architect** will not be liable to the **Contractor**, any Subcontractor, or Supplier for results of interpretations, clarifications, or decisions so rendered in good faith.

4.10.3. The **Architect** may, as the **Architect** judges desirable, issue additional drawings or instructions indicating in greater detail the construction or design of the various parts of the Work; such drawings or instructions may be effected by a Field Order or other notice to the **Contractor**, and provided such drawings or instructions are reasonably consistent with the previously existing Contract Documents, the Work shall be executed in accordance with such additional drawings or instructions without any additional cost or an extension of the Contract Time.

4.10.4. The **Architect's** decisions on matters relating to aesthetic effect must be consistent with the **City's** and will be final.

4.11. Limitation on the Architect's Responsibilities.

4.11.1. Neither the **Architect's** authority to act under the provisions of the Contract Documents nor any decision made by the **Architect** in good faith to exercise or not to exercise such authority shall give rise to any duty or responsibility of the **Architect** to the **Contractor**, any Subcontractor, any Supplier, any surety for any of them or any other person.

4.11.2 The **Architect** will not have control over or charge of and will not be responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions and programs in connection with the Work, since these are solely the **Contractor's** responsibility as provided in Article 5. The **Architect** will not be responsible for the **Contractor's** failure to carry out the Work in accordance with the Contract Documents. The **Architect** will not have control over or charge of and will not be responsible for acts or omissions of the **Contractor**, Subcontractors, Suppliers, or of any other persons performing portions of the Work.

ARTICLE 5 THE CONTRACTOR

5.1. Relationship with the City.

5.1.1. The **Contractor** is an independent contractor and not an employee of the **City**. The **Contractor** is engaged by virtue of the Contract to perform only those services contained therein. The **Contractor** is not authorized to contract on behalf of the **City** or to incur any liability on the part of the **City**.

5.2. Code of Conduct. – Not Used

5.3. Quality Assurance.

5.3.1. The **Contractor** shall be responsible for ensuring that it, all Subcontractors, Suppliers, and all persons employed to do the Work under the Contract Documents perform in a professional manner, provide a high quality of service and Work, and perform in accordance with the Contract Documents.

5.4. Supervision.

5.4.1. Competence and Efficiency. The **Contractor** shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills, attention and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

5.4.2. Construction Means, Methods, Techniques, Etc. The **Contractor** shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work under the Contract. Where the Contract Documents refer to particular construction means, methods, techniques, sequences, or procedures or indicate or imply that such are to be used in the Work, such mention is intended only to indicate that the operations of the **Contractor** shall be such as to produce at least the quality of Work implied by the operations described. The actual determination of whether or not the described operations may be safely and suitably employed on the Work shall be the responsibility of the **Contractor**, who shall notify the **Architect** in writing, prior to implementation, of the actual means, methods, techniques, sequences, or procedures which will be employed on the Work, if these differ from those mentioned in the Contract Documents. All loss, damage, liability or cost of correcting defective work arising from the employment of any construction means, methods, techniques, sequences, or procedures shall be borne by the **Contractor**, notwithstanding that such construction means, methods, techniques, sequences, or procedures are referred to, indicated or implied by the Contract Documents, unless the **Contractor** has given timely notice to the **City** and the **Architect** in writing that such means, methods, techniques, sequences, or procedures are not safe or suitable, and the **City** has then instructed the **Contractor** in writing to proceed at the **City's** risk.

5.4.3. Variance between the Contract Documents and Statutes, Ordinances, Codes, Rules and Regulations. The **Contractor** shall promptly notify the **Architect** and the **City** in writing of any variances between the Contract Documents and statutes, ordinances, codes, rules, and regulations. If the **Contractor**, without written notice to the **Architect** and the **City**, performs Work knowing that it is contrary to statutes, ordinances, codes, rules, and regulations, the **Contractor** shall assume full responsibility for such Work and shall bear the costs associated therewith, i.e., replacement, repairs, removal, and fines.

5.4.4. Acts and Omissions. The **Contractor** shall be responsible to the **City** for the acts and omissions of all persons performing or supplying the Work.

5.4.5. Inspections. The **Contractor** shall be responsible for inspection of portions of Work already performed under this Contract to determine whether such portions are in proper condition to receive subsequent Work.

5.5. Personnel.

5.5.1. Suitability. The **Contractor** shall provide competent, properly licensed and/or certified, suitably qualified, and reliable personnel to perform the Work required by the Contract Documents. The **Contractor** shall enforce strict discipline and maintain good order at the site at all times. The **Contractor** shall not employ any Subcontractor, Supplier, or other person, whether initially or as a substitute, against whom the **City** may have reasonable objection. Acceptance of any Subcontractor or other person by the **City** shall not constitute a waiver of any right of the **City** to reject defective Work.

5.5.2. Sexual Harassment. The **City** has a policy against sexual harassment. The **Contractor**, Subcontractors, and all other persons responsible for any portion of the Work are subject to the **City's** policy. The **Contractor** shall be responsible for any acts of sexual harassment committed by any persons responsible for any portion of the Work. The **Contractor** shall take appropriate action against any such individuals. Notwithstanding any remedial action taken by the **Contractor**, the **City** reserves the right to enforce its policy.

5.5.3. Weapons and Illegal Drugs. No weapons or illegal drugs are permitted on the Site. It is the responsibility of the **Contractor** to ensure that no weapons or illegal drugs are brought to the Site.

5.5.4. Maximum Work Day and Work Week. (*Reference: M.G.L. c.149 §§30 and 34*). No laborer, worker, mechanic, foreperson or inspector working within this Commonwealth in the employ of the **Contractor**, Subcontractor or other person doing or contracting to do the whole or part of the work contemplated by the Contract, shall be required or permitted to work more than eight (8) hours in any one

day or more than forty-eight (48) hours in any one week, or more than six (6) days in any one week, except in cases of emergency.

5.5.5. Lodging. (*Reference:* M.G.L. c. 149, §25). Every employee under this Contract shall lodge, board and trade where and with whom he or she elects, and neither the **Contractor** nor its agents or employees shall, either directly or indirectly, require as a condition of the employment of any person that the employee shall lodge, board or trade at a particular place or with a particular person.

5.5.6 Wage Rates. (*Reference:* M.G.L. c. 149, §27). Mechanics and apprentices, teamsters, chauffeurs and laborers performing Work shall be paid no less than the minimum rate of wages included in the Project Manual and which are made part of the Contract. They shall continue to be the minimum rate of wages for said employees during the life of the Contract. The **Contractor** shall keep a legible copy of the wage rates posted in a conspicuous place at the site during the life of the Contract. These rates of wages shall include payments by employers to health and welfare plans, pension plans and supplementary unemployment benefit plans as provided in , and such payments shall be considered as payments to persons under M.G.L. c. 149, §27 performing work as therein provided. If the **Contractor** does not make payments to a health and welfare plan, a pension plan and a supplementary unemployment benefit plan, where such payments are included in the rates of wages, the **Contractor** shall pay the amount of said payments directly to each employee engaged in the Work. If the **Contractor** pays less than the rate of wages, including payments to health and welfare funds and pension funds, or the equivalent payments in wages to any person performing Work within the classifications as determined by the Commissioner of Labor and Industries, and if the **Contractor** takes or receives for its own use or the use of any other person, as a rebate, refund or gratuity, or in any other guise, any part or portion of the wages, including payments to health and welfare funds and pension funds, or the equivalent payment in wages, paid to such person for Work done or service rendered on the Project, the **Contractor** will be subject to the penalties set forth in M.G.L. c. 149, §27.

5.5.7. Payroll Records of Employees. (*Reference:* M.G.L. c. 149 §27B). The **Contractor** and all Subcontractors who are subject to M.G.L. c. 149, §§27 and 27A shall keep a true and accurate record of all mechanics and apprentices, teamsters, chauffeurs, and laborers performing Work showing the name, address and occupational classification of each such employee, the hours worked by and the wages paid to all such employees. The **Contractor** and the Subcontractors shall submit a copy of said record to the **City** on a weekly basis.

5.5.7.1. (*Reference:* M.G.L. c. 149, §27B). The **Contractor** and all Subcontractors who are subject to M.G.L. c. 149, §§27 and 27A shall preserve their payroll records for a period of three (3) years from the date of completion of the Contract.

5.5.7.2. (*Reference:* M.G.L. c. 149, §27B). The **Contractor** and all Subcontractors who are subject to M.G.L. c. 149, §§27 and 27A shall furnish to the Commissioner of Labor and Industries and the **City** within fifteen (15) days after completion of their portion of the Work a statement executed by the **Contractor** or Subcontractor or by any authorized officer or employee of the **Contractor** or Subcontractor who supervises the payment of wages in the form found in M.G.L. c.149, §27B.

5.6. Superintendence.

5.6.1. Employment of a Superintendent. The **Contractor** shall employ a competent, properly licensed superintendent, reasonably acceptable to the **City**, and necessary assistants who shall be in attendance at the Site full time during the progress of the Work until the date of Substantial Completion and for such additional time thereafter as the **Architect** or the **City** may determine to be necessary for the expeditious completion of the Work.

5.6.2. Removal/Replacement of Superintendent. The **Contractor** shall remove the superintendent if requested to do so in writing by the **City** and shall promptly replace such superintendent with a competent person reasonably acceptable to the **City**. The superintendent shall represent the **Contractor**, and communications given to the superintendent shall be as binding as if given to the **Contractor**. The **Contractor** shall not replace the superintendent without written notice to the **City** and the **Architect**.

5.6.3. Registered Professional Engineer or Registered Land Surveyor. The **Contractor** shall retain a competent Registered Professional Engineer or Registered Land Surveyor, acceptable to the **Architect**, who shall establish the exterior lines and required elevations of all buildings and structures to be erected on the site and shall establish sufficient lines and grades for the construction of associated Work such as, but not limited to, roads, utilities, and site grading. The Engineer or Land Surveyor shall certify as to the actual location of the constructed facilities in relation to property lines, building lines, easements, and other restrictive boundaries.

5.6.4. Building Grades, Lines, Etc. The **Contractor** shall establish the building grades; lines; levels; and column, wall and partition lines required by the various Subcontractors in laying out their Work.

5.6.5. Coordination and Supervision. The **Contractor** shall coordinate and supervise the Work performed by Subcontractors to the end that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. The **Contractor** and all Subcontractors shall at all times afford each trade, any separate contractor, or the **City**, every reasonable opportunity for the installation of Work and the storage of materials.

5.6.6. Job Meetings. There shall be job meetings held on a weekly basis, or more often if required by the **City**. The **Contractor** shall arrange for and attend weekly job meetings with the **Architect** and such other persons as the **Architect** may from time to time wish to have present. The **Contractor** shall be represented by a principal, project manager, general superintendent or other authorized main office representative, as well as by the **Contractor's** own superintendent. An authorized representative of any Subcontractor or Sub-subcontractor shall attend such meetings if the representative's presence is requested by the **Architect**. Such representatives shall be empowered to make binding commitments on all matters to be discussed at such meetings, including costs, payments, Change Orders, time schedules and workforce power. Any notices required under the Contract may be served on such representatives.

5.7. Materials, Labor, Equipment, Etc.

5.7.1. Provision of. Unless otherwise provided in the Contract Documents, the **Contractor** shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up, and completion of the Work.

5.7.2. Quality and Use of. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by the **Architect**, the **Contractor** shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in

the Contract Documents.

5.7.3. Discrepancies or Defects. If the **Contractor** is unable to perform its Work because of discrepancies or defects in the work of the **City's** own forces or of a separate contractor, the **Contractor** shall immediately notify the **Architect** and the **City** in writing of the conditions that render the **Contractor** unable to so perform. Failure to notify the **Architect** constitutes an acknowledgment and acceptance of the other work as being fit and proper for integration with the **Contractor's** Work except for latent or non-apparent defects and deficiencies in the other work.

5.8. Contractor's Management and Financial Statement Requirements. (Reference: M.G.L. c. 30 §39R)

5.8.1. The words defined herein shall have the meaning stated below whenever they appear in this Paragraph:

5.8.1.1. "Contractor" means any person, corporation, partnership, joint venture, sole proprietorship, or other entity awarded a contract pursuant to M.G.L. c. 149, §44A-H, inclusive.

5.8.1.2. "Contract" means any contract awarded or executed pursuant to M.G.L. c. 149, §44A-H, inclusive, which is for an amount or estimate amount that exceed the dollar amount set forth in M.G.L. c. 30, §39R.

5.8.1.3. "Records" means books of original entry, accounts, checks, bank statements and all other banking documents, correspondence, memoranda, invoices, computer printouts, tapes, discs, papers and other documents or transcribed information of any type, whether expressed in ordinary or machine language.

5.8.1.4. "Independent Certified Public Account" means a person duly registered in good standing and entitled to practice as a certified public accountant under the laws of the place of his/her residence or principal office and who is in fact independent. In determining whether an accountant is independent with respect to a particular person, appropriate consideration should be given to all relationships between the accountant and that person or any affiliate thereof. Determination of an accountant's independence shall not be confined to the relationships existing in connection with the filing of reports with the **City**.

5.8.1.5. "Audit," when used in regard to financial statement, means an examination of records by an independent certified public accountant in accordance with generally accepted accounting principles and auditing standards for the purpose of expressing a certified opinion thereon, or, in the alternative, a qualified opinion or a declination to express an opinion for stated reasons.

5.8.1.6. "Accountant's Report," when used in regard to financial statements, means a document in which an independent certified public accountant indicates the scope of the audit which s/he has made and sets forth his/her opinion regarding the financial statements taken as a whole with listing of noted exceptions and qualifications, or an assertion to the effect that an overall opinion cannot be expressed. When an overall opinion cannot be expressed the reason therefor shall be stated. An accountant's report shall include as part thereof a signed statement by the responsible corporate officer attesting that management has fully disclosed all material facts to the independent certified public accountant, and that the audited financial statement is a true and complete statement of the financial condition of the contractor.

5.8.1.7. "Management," when used herein, means the chief executive officers, partners, principals or other person or persons primarily responsible for the financial and operational policies and practices of the contractor.

5.8.1.8. Accounting terms, unless otherwise defined herein shall have a meaning in accordance with generally accepted accounting principles and auditing standards.

5.8.2. The **Contractor** shall make, and keep for at least six (6) years after final payment, books, records, and accounts which in reasonable detail accurately and fairly reflect the transactions and dispositions of the contractor, and

5.8.3. until the expiration of six (6) years after final payment, the office of inspector general, and the deputy commissioner of capital planning and operations shall have the right to examine any books, documents, papers or records of the **Contractor** or of his/her subcontractors that directly pertain to, and involve transactions relating to, the **Contractor** or his/her subcontractors, and

5.8.4. the **Contractor** shall describe any change in the method of maintaining records or recording transactions which materially affect any statements filed with the **City**, including in his/her description the date of the change and reasons therefor, and shall accompany said description with a letter from the **Contractor's** independent certified public accountant approving or otherwise commenting on the changes, and

5.8.5. the **Contractor** has filed a statement of management on internal accounting controls as set forth below prior to the execution of the contract, and

5.8.6. the **Contractor** has filed prior to the execution of the contract and will continue to file annually, an audited financial statement for the most recent completed fiscal year as set forth below.

5.8.7. The **Contractor** shall file with the **City** a statement of management as to whether the system of internal accounting controls of the contractor and its subsidiaries reasonably assures that:

5.8.7.1. transactions are executed in accordance with management's general and specific authorization;

5.8.7.2. transactions are recorded as necessary

5.8.7.2.1. to permit preparation of financial statements in conformity with generally accepted accounting principles, and

5.8.7.2.2. to maintain accountability for assets;

5.8.7.3. access to assets is permitted only in accordance with management's general or specific authorization; and

5.8.7.4. the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action was taken with respect to any difference.

5.8.7.5. The **Contractor** shall also file with the **City** a statement prepared and signed by an independent certified public accountant stating that s/he has examined the statement of management on internal accounting controls, and expressing an opinion as to:

5.8.7.5.1. whether the representation of management in response to this paragraph and paragraphs 5.8.2. through 5.8.6 above are consistent with the result of management's evaluation of the system of internal accounting controls; and

5.8.7.5.2. whether such representations of management are, in addition, reasonable with respect to transactions and assets in amounts which would be material when measured in relation to the applicant's financial statements.

5.8.8. The **Contractor** shall annually file with the Commissioner of Capital Planning and Operations during the term of the contract a financial statement prepared by an independent certified public

accountant on the basis of an audit by such accountant. The final statement filed shall include the date of final payment. All statements shall be accompanied by an accountant's report. Such statements shall be made available to the **City** upon request.

5.9. Taxes.

5.9.1. The **Contractor** shall pay all sales, consumer, use, and other similar taxes for the Work or portions thereof which are provided by the **Contractor** which are legally enacted when bids are received, whether or not yet effective or merely scheduled to go into effect. However, the **Contractor** shall not pay, and the **City** shall not reimburse or pay the **Contractor** for, any sales taxes for building supplies or materials for which an exemption is provided in . The **City's** tax exemption number to be used by the **Contractor** in this regard is E046001383.

5.10. Permits, Licenses and Fees.

5.10.1. Unless otherwise provided, the **Contractor** shall obtain and pay the fees for all permits, licenses, and inspections which are necessary for the proper execution and completion of the Work and which are customarily secured after execution of the Contract and which are legally required. All fees for permits, licenses, and inspections required by any **City** department shall be waived.

5.11. Notices Required By Statutes, Ordinances, Codes, Rules, Regulations and Orders of the City.

5.11.1. The **Contractor** shall give notices required by statutes, ordinances, codes, rules, regulations, and orders of the **City** bearing on performance of the Work.

5.12. Additional Information from Architect.

5.12.1. The **Contractor** shall perform the Work in accordance with the Contract Documents and submittals approved pursuant to Article 4.

5.12.2. The **Contractor** shall give the **Architect** timely notice of any additional Drawings, Specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work.

5.12.3. The **Contractor** shall not proceed with any Work not clearly and consistently defined in detail in the Contract Documents, but shall request additional drawings or instructions from the **Architect** as provided in the previous Paragraph. If the **Contractor** proceeds with such Work without obtaining further drawings, Specifications, or instructions, the **Contractor** shall correct Work incorrectly done at the **Contractor's** own expense.

5.13. "Or Equal."

5.13.1. Requirements for Substitutions. (*Reference: M.G.L. c.30 §39M (b)*). Where products or materials are prescribed by manufacturer name, trade name, or catalog reference, the words "or approved equal" shall be understood to follow. An item shall be considered equal to the item so named or described if, in the opinion of the **Architect**:

- (a) it is at least equal in quality, durability, appearance, strength and design;
- (b) it performs at least equally the function imposed by the general design for the work;
- (c) it conforms substantially, even with deviations, to the detailed requirements for the Items as indicated by the specifications.

5.13.2. Net Savings. No proposed substitution will be permitted unless the **Contractor** certifies that the proposed substitution will yield a net savings to the **City** and will not extend the Contract Time.

5.13.3. Contractor's Expense. Any structural or mechanical changes made necessary to accommodate substituted equipment under this paragraph shall be at the expense of the **Contractor** or Subcontractor responsible for the Work item.

5.13.3.1. Any additional cost, or any loss or damage arising from the substitution of any material or any method for those originally specified shall be borne by the **Contractor**, notwithstanding approval or acceptance of such substitution by the **City** or the **Architect**, unless such substitution was made at the written request or direction of the **City** or the **Architect**.

5.13.3.2. All data to be provided by the **Contractor** in support of any proposed "or equal" or substitute item will be at the **Contractor's** expense.

5.13.4. Meeting Requirements. The **Contractor** shall be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. The **Architect** may require the **Contractor** to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of the **Architect**, would lead to a reasonable certainty that any material used, or proposed to be used, in the Work meets the requirements of the Contract Documents. All such data shall be furnished at the **Contractor's** expense. This provision shall not require the **Contractor** to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at the **Contractor's** expense.

5.13.5. Named Manufacturer's Product. In all cases in which a manufacturer's name, trade name, or other proprietary designation is used in connection with materials or articles to be furnished under this Contract, whether or not the phrase "or equal" is used after such name, the **Contractor** shall furnish the product of the name manufacturer(s) without substitution, unless a written request for a substitute has been submitted by the **Contractor** and approved in writing by the **Architect** as provided in the following paragraph.

5.13.6. Deviations. If the **Contractor** proposes to use a material which while suitable for the intended use, deviates in any way from the detailed requirements of the Contract Documents, the **Contractor** shall inform the **Architect** in writing of the nature of such deviations at the time the material is submitted for approval and shall request written approval of the deviation from the requirements of the Contract Documents.

5.13.7. Rejection of Deviations. In requesting approval of deviations or substitutions, the **Contractor** shall provide, upon request, evidence leading to a reasonable certainty that the proposed substitution or deviation will provide a quality of result at least equal to that otherwise attainable. If, in the opinion of the **Architect**, the evidence presented by the **Contractor** does not provide a sufficient basis for such reasonable certainty, the **Architect** may reject such substitution or deviation without further investigation.

5.13.8. Consistent Character and Quality of Design. The Contract Documents are intended to produce a building of consistent character and quality of design. All components of the building including visible items of mechanical and electrical equipment have been selected to have a coordinated design in relation to the overall appearance of the building. The **Architect** shall judge the design and appearance of proposed substitutes on the basis of their suitability in relation to the overall design of the Project, as well as for their intrinsic merits. The **Architect** will not approve as equal to materials specified proposed substitutes which, in the **Architect's** opinion, would be out of character, obtrusive, or otherwise inconsistent with the character or quality of design of the Project. In order to permit coordinated design of color and finishes the **Contractor** shall, if required by the **Architect**, furnish the substituted material in any color, finish, texture, or pattern which would have been available from the manufacturer originally specified, at no additional cost to the **City**.

5.13.9. Warranty. The warranties provided herein shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

5.13.10. Architect's Approval. The **Architect** will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed, or utilized without the **Architect's** prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. The **City** may require the **Contractor** to furnish at the **Contractor's** expense a special performance guarantee or other surety with respect to any "or equal" or substitute. The **Architect** will record the time required by the **Architect** and its consultants in evaluating substitutes proposed or submitted by the **Contractor** and in making changes in the Contract Documents (or in the provisions of any other direct contract with the **City** for work on the Project) occasioned thereby. Whether or not the **Architect** accepts a substitute item so proposed or submitted by the **Contractor**, the **Contractor** shall reimburse the **City** for the charges of the **Architect** and its consultants for evaluating each such proposed substitute item.

5.14. Substitute Construction Methods or Procedures.

5.14.1. If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, the **Contractor** may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to the **Architect**. The **Contractor** shall submit sufficient information to allow the **Architect**, in the **Architect's** sole discretion, to determine whether the substitute proposed is equivalent to that expressly called for by the Contract Documents.

5.15. Contractor's Progress Schedule.

5.15.1. Before Starting Construction. Within ten (10) days after the date of the Notice to Proceed, the **Contractor** shall submit to the **Architect** for review:

5.15.1.1. a preliminary progress schedule indicating the times (number of days or dates) for starting and completing the various stages of the Work;

5.15.1.2. a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal; and

5.15.1.3. a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Sum and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include and appropriate amount of overhead and profit applicable to each item of Work.

5.15.2. Review of Progress Schedule. At least ten (10) days prior to the commencement of construction, the **Architect**, the **Contractor**, and any other appropriate persons will meet to review and discuss the acceptability to the **Architect** of the progress schedule. The **Contractor** will have an additional ten (10) days to make corrections and adjustments and to complete and resubmit the schedule. No progress payment shall be made to the **Contractor** until the schedule is submitted to and acceptable to the **Architect** as provided below.

5.15.3. Acceptability of Progress Schedule. The progress schedule will be acceptable to the **Architect** if, according to the **Architect**, it provides an orderly progression of the Work to completion within any specified time frame, but such acceptance will neither impose on the **Architect** responsibility for the sequencing, scheduling, or progress of the Work nor interfere with or relieve the **Contractor** from the **Contractor's** full responsibility therefor. The **Contractor's** schedule of Submittals must be acceptable to the **Architect** if it provides a workable arrangement for reviewing and processing the required Submittals. The **Contractor's** schedule of values must be acceptable to the **Architect** as to form and substance.

5.15.4. Copies. After the **Architect** has approved the schedule, the **Contractor** shall submit to the **Architect** one (1) electronic copy in PDF format, and four hard (4) copies bearing the **Contractor's** stamp of approval as a representation to the **City** that the **Contractor** has determined or verified all data on that

progress schedule and that the **Contractor**, the Subcontractors and Suppliers have reviewed and coordinated the sequences in that progress schedule with the requirements of the Work.

5.15.5. Adjustment of Schedule. The **Contractor** shall adhere to the established progress schedule which may be adjusted from time to time as follows: the **Contractor** shall submit to the **Architect** for acceptance proposed adjustments in the progress schedule that will not change the Contract Time. Such adjustments will conform generally to the progress schedule then in effect and will comply with any provisions of the requirements applicable thereto.

5.15.6. During Construction. The **Contractor** shall submit monthly progress schedules to the **Architect**. The schedules shall stay current with the **Contractor's** approach to the Work remaining. The **Contractor** shall present a revised progress schedule at the job meetings at least once per month.

5.15.7. Schedule of Submittals. The **Contractor** shall prepare and keep current, for the **Architect's** approval, a schedule of Submittals which is coordinated with the **Contractor's** construction schedule and allows the **Architect** reasonable time to review Submittals.

5.16. Project Coordination.

5.16.1. In General. The **Contractor** shall be responsible for the proper coordination of the Work of all of the trades.

5.16.2. Coordination with Subcontractors. The **Contractor** shall coordinate the work of each Subcontractor with the Work of every other Subcontractor whose Work affects the other.

5.16.3. Coordination with the City's Own Forces or Separate Contractors. The **Contractor** shall coordinate its operations with those of the **City's** own forces or separate contractors. The **Contractor** shall provide the **City's** own forces and separate contractors a reasonable opportunity for the handling, unloading and storage of their materials and equipment and execution of their work. The **Contractor** shall connect and coordinate its Work with theirs.

5.16.4. Coordination with Utility Companies. The **Contractor** shall coordinate its operations with all the appropriate utility companies to assure that the utilities required on the Project are available and functioning properly pursuant to the requirements of the Contract Documents.

5.17. Project Photographs

5.17.1 In General. The **Contractor** shall take, at its own expense, interior and exterior photographs at the site, from different vantages as directed by the **Architect** or the **City**, before beginning any Work and thereafter on the first work day of each month until final completion of the Work, including final Site photos. The photographs shall be taken by a skilled commercial photographer. The number of photographs required shall be at the discretion of the **City** or the **Architect**.

5.17.2. Prints and Negatives. Within seven (7) days after the photographs have been taken, the **Contractor** shall provide to the **City** and the **Architect** copies in an electronic format such as JPEG. Each print shall state the date of the photograph, the name of the Project, the description of the view and the name and address of the photographer. The City also requires all photographs to be provided on a Compact Disc (CD) at the end of the Project.

5.17.3. Failure to Comply. Should the **Contractor** fail to adhere to any requirement set forth in the previous two paragraphs, the **City** may have the photographs taken at the **Contractor's** expense or receive a set-off against the **Contractor's** next application for payment.

5.18. Record Documents and Samples at the Site.

5.18.1. The **Contractor** shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Modifications, Change Orders, Work Change Directives, Field Orders and written interpretations and clarifications in good order and annotated neatly, legibly and accurately at the end of each working day to show the exact location of Work installed, and any variations from the Contract Documents. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to the **Architect** for reference. Upon completion of the Work, these record documents, Samples and Shop Drawings will be delivered by the **Contractor** to the **Architect** for the **City**.

5.19. Submittals.

5.19.1. Purpose. The purpose of Submittals is to demonstrate for those portions of the Work for which Submittals are required the way the **Contractor** proposes to conform to the information given and the design concept expressed in the Contract Documents.

5.19.2. Submittal Procedure. Within ten (10) days from the Notice to Proceed, the **Contractor** shall submit to the **Architect** a completed Submittals schedule. The **Contractor** shall review, approve, and submit to the **Architect** Submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the **City** or of separate contractors. Submittals made by the **Contractor** which are not required by the Contract Documents may be returned without action. The schedules shall be updated and resubmitted each month. All Submittals will be identified as the **Architect** may require and in the number specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show the **Architect** the materials and equipment that the **Contractor** proposes to provide and to enable the **Architect** to review the information for the limited purposes stated below.

5.19.3. Samples. The **Contractor** shall also submit Samples to the **Architect** for review and approval in accordance with said accepted schedule of Submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which it is intended and otherwise as the **Architect** may require to enable the **Architect** to review the Submittal for the limited purposed stated below. The numbers of each Sample to be submitted will be as specified in the Specifications. Unless otherwise specified in the Specifications, three (3) specimens of each Sample shall be submitted.

5.19.3.1. The Samples shall be of sufficient size to permit proper evaluation of material. Where variations in color or other characteristics are to be expected, samples showing the minimum range of variation shall be submitted. Materials exceeding the range of variation of the approved Samples will not be approved on the Work.

5.19.3.2. All costs associated with delivery of Samples will be paid by the **Contractor**.

5.19.4. Contractor's Verifications. Before submitting each Submittal, the **Contractor** shall have determined and verified:

5.19.4.1. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;

5.19.4.2. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and

5.19.4.3. all information relative to the **Contractor's** sole responsibilities in respect of means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incident thereto.

5.19.5. Contractor's Representations. By approving and providing Submittals, the **Contractor** thereby represents that the **Contractor** has determined and verified all dimensions, quantities, field dimensions, relations to existing Work, coordination with Work to be installed later, coordination with information on previously accepted Submittals and verification of compliance with all the requirements of the Contract Documents. The accuracy of all such information is the responsibility of the **Contractor**. In reviewing Submittals, the **Architect** shall be entitled to rely upon the **Contractor's** representation that such information is correct and accurate.

5.19.6. Coordination. The **Contractor** shall also have reviewed and coordinated each Submittal with other Submittals and with the requirements of the Work and the Contract Documents.

5.19.7. Stamp or Specific Written Indication. Each Submittal will bear a stamp or specific written indication that the **Contractor** has satisfied the **Contractor's** obligations under the Contract Documents with respect to the **Contractor's** review and approval of that Submittal.

5.19.8. Written Notice of Variations. At the time of each Submittal, the **Contractor** shall give the **Architect** specific written notice of such variations, if any, that the Submittal may have from the requirements of the Contract Documents. Such notice is to be in a written communication separate from the Submittal. Moreover, the **Contractor** shall make a specific notation on each Submittal to the **Architect** for review and approval of each such variation.

5.19.9. Review and Approval by the Architect. The **Contractor** shall perform no portion of the Work requiring a Submittal until the respective Submittal has been approved by the **Architect**. Such Work shall be in accordance with approved Submittals.

5.19.9.1. The **Architect** will review and approve Submittals in accordance with the schedule of Submittals accepted by the **Architect** as required above. The **Architect's** review and approval will be only to determine if the items covered by the Submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated in the Contract Documents. The **Architect's** review and approval will not extend to means, method, technique, sequences, or procedures of construction (except where a particular means, method, technique, sequences or procedures of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.

5.19.10. Deviations. The **Contractor** shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the **Architect's** approval of Submittals unless the **Contractor** has specifically informed the **Architect** in writing of such deviation at the time of Submittal and the **Architect** has given written approval to the specific deviation. The **Contractor** shall not be relieved of responsibility for errors or omissions in Submittals by the **Architect's** approval thereof.

5.19.11. Revisions. The **Contractor** shall make corrections required by the **Architect** and shall return the required number of corrected copies of Submittals and submit as required new Submittals for review and approval. The **Contractor** shall direct specific attention, in writing or on resubmitted Submittals, to revisions other than those requested by the **Architect** on previous Submittals. Unless such written notice has been given, the **Architect's** approval of a resubmitted Submittal shall not constitute approval of any changes not requested on the prior Submittal.

5.19.12. Related Work. Where a Submittal is required by the Contract Documents or the schedule of Submittals accepted by the **Architect**, any related Work performed prior to the **Architect's** review and approval of the pertinent Submittal will be at the sole expense and responsibility of the **Contractor**.

5.19.13. Informational Submittals. Informational Submittals upon which the **Architect** is not expected to

take responsive action may be so identified in the Contract Documents.

5.19.14. Certification. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the **City** shall be entitled to rely upon such certifications, and neither the **City** nor the **Architect** shall be expected to make any independent examination with respect thereto.

5.20. Continuing the Work.

5.20.1. The **Contractor** shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with the **City**. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as otherwise provided herein or as the **City** and the **Contractor** may agree in writing.

5.21. Use of Site; Access to the Work .

5.21.1. The right of possession of the premises and the improvements made thereon by the **Contractor** shall remain at all times in the **City**. The **Contractor's** right to entry and use thereof arises solely from the permission granted by the **City** under the Contract Documents. The **Contractor** shall confine the **Contractor's** apparatus, the storage of materials, and the operations of the **Contractor's** workers to limits indicated by law, ordinance, the Contract Documents and permits and/or directions of the **Architect** and shall not unreasonably encumber the premises with the **Contractor's** materials. The **City** shall not be liable to the **Contractor**, the Subcontractors, Suppliers, or anyone else with respect to the conditions of the premises, except for a condition caused directly and solely by the negligence of the **City**.

5.21.2. At all times, the **City** and the **Architect** shall have access to the Work.

5.22. Protection of Persons and Property.

5.22.1. In General. The **Contractor** shall be responsible for initiating, maintaining, and supervising all health and safety precautions and programs in connection with the performance of the Contract. The **Contractor** is responsible for the implementation of all Federal, State, and local health and safety requirements.

5.22.2. The **Contractor** shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to:

5.22.2.1. employees on the site and other persons who may be affected thereby;

5.22.2.2. the Work, materials, and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the **Contractor**, Subcontractors, or Sub-subcontractors;

5.22.2.3. other property at the site or adjacent or in close proximity thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and

5.22.2.4. any other property of the **City**, whether or not forming part of the Work, located at the site or adjacent thereto in areas to which the **Contractor** has access.

5.22.3. Notices and Compliance. The **Contractor** shall give notices and comply in all other respects with applicable laws, ordinances, rules, regulations, codes, and lawful orders of public authorities bearing on the safety of persons or property or their protection from damage, injury, or loss. The **Contractor** shall notify owners of adjacent and nearby properties of underground facilities and utility owners when prosecution of the Work may affect them and shall cooperate with them in the protection, removal,

relocation, and replacement of their property.

5.22.4. Erection and Maintenance of Safeguards. The **Contractor** shall erect and maintain, as required by existing conditions and the terms of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent and nearby sites and utilities.

5.22.5. Hazardous Materials and Equipment. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the **Contractor** shall exercise utmost care and carry on such activities under the supervision of properly qualified personnel.

5.22.6. Damage to Property. The **Contractor** shall promptly remedy damage and loss to property referred to above. If the damage or loss is due in whole or in part to the **Contractor's** failure to take the precautions required herein, the **Contractor** shall bear the cost, subject to any reimbursement to which the **Contractor** is entitled under property insurance required by the Contract Documents. The **Contractor** shall be fully and solely responsible for all Work and other operations carried out on adjacent properties. The insurance required under Article 8 shall cover such Work or operations, and the **Contractor** shall indemnify and defend the **City**, the **Architect**, and the owners of such adjacent or nearby properties from and against all claims, suits, losses, or costs arising out of such Work or operations.

5.22.7. Fire Protection Equipment and Services. The **Contractor** shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services and shall comply with all reasonable recommendations regarding fire protection made by the representatives of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The **Contractor** shall submit a letter to the Architect stating that the Contractor has complied with such recommendations. The area within the site limits shall be kept orderly and clean and all combustible rubbish shall be promptly removed from the site.

5.22.8. Protection of Excavations, Trenches, Etc. The **Contractor** shall at all times protect excavations, trenches, buildings and materials from rain water, ground water, backup or leakage of sewers, drains and other piping, and from water of any other origin and shall remove promptly any accumulation of water. The **Contractor** shall provide and operate all pumps, piping, and other equipment necessary to this end.

5.22.9. Snow and Ice Removal. The **Contractor** shall remove snow and ice which might result in damage or delay.

5.22.10. Safety Representative. The **Contractor** shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

5.22.11. Weather Protection. (*Reference:* M.G.L. c.149). The **Contractor** shall install weather protection and furnish adequate heat in the protected area from November 1 through March 31.

5.22.12. Security. The **Contractor** shall provide, within the Contract Sum, a sufficient number of security personnel at the Site at all times when the **Contractor's** personnel are not present, from commencement of the Work until Substantial Completion to assure that the Site, the facility, and the Work, and all materials and equipment stored at the Site are fully and completely protected against loss or damage due to vandalism, theft, or malicious mischief. If the **Contractor** elects, in addition, to use guard dogs for this purpose, each dog shall at all times be accompanied by an adult handler. If the **Contractor** fails to comply with the requirements of this paragraph, then the **City** may provide appropriate security and charge the cost thereof to the **Contractor**. The **City's** provision of such security, or failure to do so, shall not relieve the **Contractor** of its responsibility to pay for loss or damage due to vandalism, theft, or malicious mischief at the Site.

5.22.13. Hazard Communication Programs. The **Contractor** shall be responsible for coordinating any exchange of material safety data sheets or other hazard communications information required to be made available to or exchanged between or among employers at the site in accordance with laws, codes and regulations.

5.22.14. Noise Pollution Control. The **Contractor** shall comply with all applicable provisions of Lowell Municipal Code Chapter 8.16.

5.23. Cutting and Patching.

5.23.1. In General. Unless otherwise provided in the Contract Documents, the **Contractor** shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly, including the work of the City or of separate contractors.

5.23.2. Damage to Work of City or of Separate Contractor. The **Contractor** shall not damage or endanger a portion of the Work or fully or partially completed construction of the **City** or separate contractors by cutting, patching, or otherwise altering such construction, or by excavation. The **Contractor** shall not cut or otherwise alter such construction by the **City** or a separate contractor except with prior written consent of the **City** and of such separate contractor; such consent shall not be unreasonably withheld. The **Contractor** shall not unreasonably withhold from the **City** or a separate contractor the **Contractor's** consent to cutting or otherwise altering the Work.

5.23.3. Damage Caused by Contractor. Should the **Contractor** cause damage to the work or property of any separate contractor at the Site, or should any claim arising out of the **Contractor's** performance of Work at the Site be made by any separate contractor against the **Contractor**, the **City**, the **Architect**, or any of the **Architect's** consultants, the **Contractor** shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration or at law. The **Contractor** shall, to the fullest extent permitted by laws and regulations, indemnify and hold harmless the **City**, the **Architect**, and the **Architect's** consultants from and against all claims, damages, losses and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals, and court and arbitration or mediation costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any separate contractor against the **City**, the **Architect**, or any of the **Architect's** consultants, to the extent based on a claim arising out of the **Contractor's** performance of the Work. Should a separate contractor cause damage to the Work or property of the **Contractor** or should the performance of work by any separate contractor at the site give rise to any other claim, the **Contractor** shall not institute any action, legal or equitable, against the **City**, the **Architect**, or any of the **Architect's** consultants, or permit any action against any of them to be maintained and continued in its name or for its benefit in any court or before any arbiter which seeks to impose liability on or to recover damages from the **City**, the **Architect**, or any of the **Architect's** consultants, on account of any such damage or claim. If the **Contractor** delays at any time in performing or furnishing Work by any act or neglect of a separate contractor and the City and the Contractor are unable to agree as to the extent of any adjustment in the Contract Time attributable thereto, the **Contractor** may make a claim for an extension of time in accordance with Article 16. An extension of the Contract Time shall be the **Contractor's** exclusive remedy with respect to the **City**, the **Architect**, and the **Architect's** consultants, for any delay, disruption, interference, or hindrance caused by any separate contractor.

5.24. Cleaning Up.

5.24.1. During the progress of the Work, the **Contractor** shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract or other debris. At the completion of the Work, the **Contractor** shall remove from and about the Project all waste materials, rubbish, debris, the **Contractor's** tools, construction equipment, machinery and surplus materials. The **Contractor** shall leave the site clean and ready for occupancy by the **City** at Substantial Completion of the Work. Immediately prior to the **Architect's** inspection for Substantial Completion, the **Contractor** shall completely clean the premises. Concrete and ceramic surfaces shall be cleaned and

washed. Resilient coverings shall be cleaned, waxed and buffed. Woodwork shall be dusted and cleaned. Sash, fixtures and equipment shall be thoroughly cleaned. Stains, spots, dust, marks and smears shall be removed from all surfaces. Hardware and all metal surfaces shall be cleaned and polished. Glass and plastic surfaces shall be thoroughly cleaned by professional window cleaners. All damaged, broken or scratched glass or plastic shall be replaced by the **Contractor** at the **Contractor's** expense. The **Contractor** shall restore to original condition all property not designated for alteration by the Contract Documents.

5.24.2. If the **Contractor** fails to clean up as provided herein, the **City** may do so and charge the cost thereof to the **Contractor**.

5.25. Royalties and Patents.

5.25.1. The **Contractor** shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. To the fullest extent permitted by law, the **Contractor** shall indemnify and hold harmless the **City** and the **Architect** from and against all claims, costs, losses, and damages arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the work or resulting from the incorporation in the work of any invention, design, process, product, or device not specified in the Contract Documents.

5.26. Contractor's Obligation to Perform.

5.26.1. The **Contractor's** obligation to perform and complete the Work in accordance with the Contract Documents is absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of the **Contractor's** obligation to perform the Work in accordance with the Contract Documents:

5.26.1.1. observations by the **Architect**;

5.26.1.2. recommendation of any progress or final payment by the **Architect**;

5.26.1.3. the issuance of a certificate of Substantial Completion or any payment by the **City** to the **Contractor** under the Contract Documents;

5.26.1.4. use or occupancy of the Work, Project, or Site, or any part thereof, by the **City**;

5.26.1.5. any acceptance by the **City** or any failure to do so;

5.26.1.6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptance by the **Architect**;

5.26.1.7. any inspection, test, or approval by others; or

5.26.1.8. any correction of defective Work by the **City**.

5.27. Indemnification and Covenant Not to Sue.

5.27.1. To the fullest extent permitted by law, the **Contractor** shall assume the defense of, indemnify and hold harmless the **City**, the **Architect**, the **Architect's** consultants and agents and employees of any of them from and against claims, damages, losses, and expenses, including, but not limited, to attorneys' fee, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom caused in whole or in part by alleged negligent acts or omissions of the **Contractor**, a Subcontractor, anyone directly or indirectly

employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this paragraph.

5.27.2. In claims against any person or entity indemnified under the foregoing paragraph by an employee of the **Contractor**, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under the foregoing paragraph shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for the **Contractor** or a Subcontractor under Workers' Compensation laws, disability benefit acts or other employee benefit acts.

5.27.3. The obligations of the **Contractor** in this Article shall not extend to the liability of the **Architect**, the **Architect's** consultants, and agents or employees of any of them arising out of (1) the preparation of maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications, or (2) directions or instructions given by the **Architect**, the **Architect's** consultants and agents or employees of any of them, provided such instructions or directions are the primary cause of the injury or damage.

5.27.4. The **Contractor**, or any successor, assign, or subrogee of the **Contractor** agrees not to bring any civil suit, action, or other proceeding in law, equity or arbitration against the **Architect**, or the officers, employees, agents, or consultants of the **Architect**, for the enforcement of any action which the **Contractor** may have arising out of or in any manner connected with the Work. The **Contractor** shall assure that this covenant not to sue is contained in all subcontracts and sub-subcontracts of every tier and shall assure its enforcement. The **Architect**, its officers, employees, agents, and consultants are intended third-party beneficiaries of this covenant not to sue, and are entitled to enforce this covenant in law or equity.

5.28. Survival of Obligations.

5.28.1. All representations, indemnifications, warranties, and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Contract.

ARTICLE 6 SUBCONTRACTORS

6.1. Use of Subcontractors.

6.1.1. The **Contractor** shall use the Subcontractors named in the **Contractor's** Bid.

6.2. Substitution of Subcontractors.

6.2.1. The **Contractor** shall not substitute another Subcontractor therefor without notice to the **City** and the **City's** prior written consent of such substitution.

6.3. Names of Subcontractors.

6.3.1. Upon execution of the Contract with the **City**, the **Contractor** shall provide in writing to the **City**, through the **Architect**, the names, addresses, telephone numbers, and fax numbers of all persons proposed for each principal portion of the Work.

6.4. Objections to Subcontractors.

6.4.1. The **Contractor** shall not use any Subcontractor against whom the **City** has a reasonable objection. The **Contractor** shall not be required to contract with any person or entity against whom it has a reasonable objection.

6.5. Form of the Subcontract.

6.5.1. All Work performed by a Subcontractor shall be through an appropriate subcontract. The **Contractor** shall use the form of subcontract set forth in M.G.L. c.149, §44F when subcontracting with filed sub-bidders. The form of subcontract for non-filed sub-bidders shall be submitted to the **Purchasing Agent** for her approval, which shall not be unreasonably withheld or delayed.

6.6. Content of the Subcontract.

6.6.1. In addition to all statutorily mandated provisions and provisions required elsewhere in the Contract Documents, each subcontract shall expressly provide that:

6.6.1.1. Each subcontract agreement for a portion of the Work is assigned by the **Contractor** to the **City** provided that:

6.6.1.1.1. the assignment is effective only after termination of the Contract by the **City** or the **Contractor** and only for those subcontract agreements which the **City** accepts by notifying the Subcontractor in writing; and

6.6.1.1.2. the assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

6.6.1.2. Each Subcontractor is bound by the requirements of the Contract Documents for the express benefit of the **City**.

6.6.1.3. Each Subcontractor shall assume toward the **Contractor** all the obligations which the **Contractor** assumes toward the **City** and the **Architect**, unless otherwise provided by law.

ARTICLE 7 PERFORMANCE AND PAYMENT BONDS

7.1. Form of Bonds.

7.1.1. The performance and labor and material or payment bonds shall be in the form required by the **City**, copies of which are included in the Project Manual. The **City** reserves the right to reject any bond which does not conform to the **City's** requirements.

7.2. Furnished by the Contractor.

7.2.1. (Reference: M.G.L. c.149, §44E(2), M.G.L. c.149 §29). The **Contractor** shall furnish a performance bond and a labor and materials or payment bond, each with a surety company qualified to do business under the laws of the Commonwealth and satisfactory to the **City** and each in the sum of the Contract Sum, the premiums for which are to be paid by the **Contractor** and are included in the Contract Sum. The bonds shall remain in effect until final payment is made. The sum of the performance bond shall increase each time the Contract Sum is increased as a result of a Change Order.

7.3. Furnished by the Subcontractor.

7.3.1. (Reference: M.G.L. c.149 §44F(3)). A Subcontractor shall furnish a performance and a labor and materials or payment bond at the request of the **Contractor**. In the case of prequalification the Subcontractor must furnish to the Contractor a performance bond and a labor and materials or payment bond, each with a surety company qualified to do business under the laws of the Commonwealth and each in the sum of the subcontract sum, the premiums for which are paid by the subcontractor. Said bonds shall be for the benefit of the **Contractor** and shall secure the performance of the subcontract by the

subcontractor and shall indemnify and hold harmless the **Contractor** and the surety or sureties under the labor and materials or payment bond furnished by the **Contractor** to the **City** against (1) any and all loss and expense arising out of any and all claims in connection with the performance of said subcontract which would be required to be paid under the labor and materials or payment bond furnished by the **Contractor** to the **City** and (2) attorneys' fees in the event that the Subcontractor, after notice, fails to assume the defense of and defend such claims.

7.4. Submission to the City.

7.4.1. The **Contractor** must submit the performance and a labor and materials or payment bonds to the **City** upon the **Contractor's** execution of the Agreement. Contractor must also submit a copy of the subcontractor's performance and labor and materials or payment bond to the City.

ARTICLE 8 INSURANCE REQUIREMENTS

8.1. Worker's Compensation.

8.1.1. (*Reference: M.G.L. c.149 §34A*). Before commencing performance of the Contract, the **Contractor** shall provide by insurance for the payment of compensation and the furnishing of other benefits under M.G.L. c. 152 to all persons to be employed under the Contract, and the **Contractor** shall continue such insurance in full force and effect during the term of the Contract. Sufficient proof of compliance with this paragraph must be furnished at the time of execution of this Contract.

8.2 Additional Insured.

8.2.1. Each policy excluding only the Worker's Compensation and Owners Protective Liability must list the **City and Architect/Engineer** as an additional insured.

8.3. Insurance Rating.

8.3.1. Any insurance carrier utilized to fulfill the insurance requirements of this Contract shall have a minimum A.M. Best rating of A-X.

8.4. Premiums.

8.4.1. The **Contractor** must provide the required insurance at its own expense. Failure to provide and continue in force shall be deemed a material breach of the Contract and shall operate as an immediate termination thereof. No cancellation of such insurance, whether by the insurer or by the insured, shall be valid unless written notice thereof is given by the party proposing cancellation to the other party and to the **City** at least fifteen (15) days prior to the intended effective date thereof, which date shall be expressed in said notice.

8.5. Notice of Occurrence.

8.5.1. Notice of occurrence shall be given to the **City** Manager, **City** of Lowell, **City** Hall, 375 Merrimack Street, 2nd Floor, Room 43, Lowell, MA 01852 and, at the option of the **Contractor**, any other **City** official permitted by law to receive notice.

8.6. Waiver of Subrogation.

8.6.1. The **Contractor** and all Subcontractors waive subrogation rights against the **City** for all losses.

8.7. Coverage Period.

8.7.1. Each insurance policy must cover the entire contract period and beyond as specified in the following sections.

8.8. Policies and Limits.

8.8.1. The insurance required shall include all major division of coverage and shall be on a [comprehensive] commercial general form basis including Premise and Operations (including X-C-U), bodily injury(including death);broad form property damage (including completed operations) including injury to, or destruction of tangible property, including loss of use therefrom; personal injury; Owner's Protective (as a separate policy), Products and Completed Operations, and Owned, Non-owned, Leased, and Hired Motor Vehicles. Such insurance shall be written for not less than any limits of liability required by law or the following limits, whichever are greater:

Owner's Protective Liability (as a separate policy)	
Each Occurrence	\$1 Million
Aggregate	\$2 Million
Commercial Liability	
General Aggregate - per project	\$2 Million
Products Completed Operations	
Aggregate – per project	\$1 Million
Personal Injury and Advertising Limit	\$1 Million
Each Occurrence	\$1 Million

This policy shall include contractual liability coverage insuring the contractor's indemnity obligations under this Contract. The contractual and completed operations coverage shall be maintained on the City's and Indemnities' behalf for a period of two (2) years after final completion and acceptance by City. If the Work includes work to be performed within 50 feet of a railroad, any exclusion for liability assumed under contract for work within 50 feet of a railroad shall be deleted.

This policy shall include City and any other party at interest requested by City as an additional insured with endorsements equivalent to ISO CG 20 10 for ongoing operations and to ISO CG 20 37 for completed operations. This policy shall be primary and non-contributory with respect to any other insurance available to an additional insured. The policy shall include endorsement equivalent to ISO CG 24 04, a Waiver of Subrogation in favor of City. The policy shall include endorsement CG 24 10, Coverage for injury to leased workers.

Railroad Protective Liability (if required by an abutter, permittee or other)

Each Occurrence	\$2 Million
Aggregate	\$6 Million

Automotive-for all owned, non-owned, hired and leased vehicles

Combined single limit	\$1 Million
or	
Bodily injury- each person	\$100,000
each accident	\$1 Million
Property damage-each occurrence	\$1 Million

If hauling contaminants and/or pollutants, the policy shall include a CA 99 48 Broadened Pollution Endorsement. must adhere to Sections 29 and 30 of the Motor Carrier Act of 1980, which shall contain coverage Form MCS-90.The policy shall name City as an additional insured. The policy shall contain a Waiver of Subrogation in favor of City.

Builder's Risk (Value of the contract)

The Contractor shall purchase and maintain coverage against loss or damage on all Work included in this

Contract in an amount equal to the Initial Contract Sum, plus the value of subsequent contract modifications and the cost of materials supplied or installed by others, comprising the total value for the entire Project on the site on a replacement cost basis without optional deductibles. Such coverage shall be written on an all risks basis or equivalent form and shall include, without limitation, insurance against perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, terrorism, collapse, earthquake, flood, windstorm, false work, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's services and expenses and City's loss of use in a mutually agreed amount, required as a result of an insured loss. This policy and/or installation floater shall include transportation and stored materials coverage in an amount equal to the value of the stored materials as required below.

The Contractor shall maintain insurance on delivered and/or stored material designated to be incorporated in the Work against fire, theft or other hazards, while stored at an off site location.

The policy or policies shall specifically state they shall include the interests of the City, the Contractor and sub contractors of every tier as insured's.

Coverage shall include any costs for work performed by the Architect or any consultant as the result of a loss experienced during the term of this Contract.

Coverage shall include permission for temporary occupancy.

Coverage shall be maintained until final completion and acceptance by the City of the Work and final payment has been made.

The Contractor is responsible for the payment of any and all deductibles under all of the insurance provided by the Contractor.

Contractor Pollution Liability

Combined single limit- per occurrence	\$1 Million
Annual aggregate	\$3 Million

The Contractor shall purchase and maintain coverage for bodily injury and property damage resulting from liability arising out of pollution related exposures such as mold, fungi, or bacteria abatement, asbestos abatement, lead paint abatement, tank removal, removal of contaminated soil, etc. The insurance policy shall cover the liability of the Contractor during the processes of identification, removal, storage, transport and disposal of hazardous waste, lead, contaminated soil and/or asbestos abatement. The policy shall include coverage for on-Site and off-Site bodily injury and loss of, damage to, or loss of use of property, directly or indirectly arising out of the discharge, dispersal, release or escape of smoke, vapors, soot, fumes, acids, alkalis, toxic chemicals, liquids or gas, waste materials or other irritants, contaminants or pollutants into or upon the land, the atmosphere or any water course or body of water, whether it be gradual or sudden and accidental. The policy shall also include defense and clean-up costs. The City shall be named as an additional insured and coverage must be on an occurrence basis.

Excess Umbrella Liability

General aggregate	\$5 Million
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Worker's Compensation

Coverage A	Statutory	
Coverage B	Each Accident	\$100,000
	Disease-Policy limit	\$500,000
	Disease-Each Employee	\$100,000

8.9. Excess Umbrella Liability Insurance.

8.9.1. The **Contractor** may purchase and maintain excess liability insurance in the umbrella form in order to satisfy the limits of liability required for the insurance to be purchased and maintained in accordance with the requirements set forth above. Any such amounts must be in addition to the umbrella limits

required, must list all underlying policies, and must list the **City** as an additional insured. Evidence of such excess liability shall be delivered to the **City** in the same form and manner as the required insurance policies.

8.10. Amendment of Requirements.

8.10.1. The **City** reserves the right, at its sole discretion, to amend the insurance requirements contained herein.

8.11. Occurrence Basis.

8.11.1. All insurance shall be written on an occurrence basis, unless the **City** approves in writing coverage on a claims-made basis. Coverages whether written on an occurrence or a claims-made basis shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment.

8.12. Certificates of Insurance.

8.12.1. Certificates of Insurance acceptable to the **City** and confirming the insurance coverage required herein are attached to the Contract. The **City** shall have no obligation to execute the Contract and may award the Contract to the next lowest responsible and responsive bidder, if such insurance certificates have not been provided to the **City** within five (5) business days after presentation of the Contract to the **Contractor** for execution. If requested by the City the Contractor will provide complete certified copies of every insurance policy before commencing and during performance of the Contract.

8.13. Endorsements.

8.13.1. The **Contractor** shall furnish to the **City** copies of any endorsements that are subsequently issued amending limits of coverage.

8.14. Property Insurance.

8.14.1. The **City** does not intend to purchase property insurance covering the Project or the Work. The **Contractor** shall be required to provide such insurance, and the **Contractor** should procure property insurance which will protect the interests of the **Contractor**, Subcontractor and Sub-subcontractors in the Work. The **Contractor** understands that such property insurance is solely the **Contractor's** responsibility, and the **Contractor**, its Subcontractors and Sub-subcontractors shall have no claim against the **City** on account of the **City's** failure to provide such property insurance. The **Contractor** shall promptly replace all damaged Work in which it or its Subcontractors and Sub-subcontractors have an insurable interest, and all Work which is stolen, vandalized, or damaged due to the **Contractor's** failure to protect the site as required by Article 5, at no additional cost to the **City**, whether or not the **Contractor** procures property insurance with respect to such Work as hereinabove provided.

ARTICLE 9 TESTS AND INSPECTIONS

9.1. Access.

9.1.1. The **City**, the **Architect**, and all other persons designated by the **City** shall have access to the Work at reasonable times for observing, inspecting, and testing. The **Contractor** shall provide them with proper and safe conditions for such access and advise them of the **Contractor's** site safety procedures and programs so that they may comply therewith as applicable.

9.2. Tests and Inspections.

9.2.1. The **Contractor** shall give the **Architect** timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

9.2.2. Unless otherwise provided, the **Contractor** shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the **City**, or with the appropriate public authority and shall bear all related costs of tests, inspections, and approvals. If the laws or regulations of any public body having jurisdiction require any Work or part thereof specifically to be inspected, tested, or approved by an employee or other representative of such public body, the **Contractor** shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith and furnish the **Architect** with the required certificates of inspection, testing, or approval.

9.2.3. The **Contractor** shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for the **Architect's** acceptance of materials or equipment to be incorporated into the Work, or of materials, mix designs, or equipment submitted for approval prior to the **Contractor's** purchase thereof for incorporation into the Work.

9.2.4. If any Work that is to be inspected, tested, or approved is covered by the **Contractor**, Subcontractor, or Sub-subcontractor without the prior written consent of the **Architect**, it must be uncovered for observation, inspection, testing, or approval, if requested by the **Architect**. The **Contractor** must recover the Work at its own expense.

9.2.5. The **Contractor** shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the **Architect** in the **Architect's** administration of the Contract or by tests, inspections, or approvals required or performed by persons other than the **Contractor**.

ARTICLE 10 UNCOVERING AND CORRECTING WORK

10.1. Uncovering Work.

10.1.1. If a portion of the Work is covered contrary to the **Architect's** request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the **Architect**, be uncovered for the **Architect's** observation and be replaced, both at the **Contractor's** expense and without change in the Contract Time.

10.1.2. If a portion of the Work has been covered which the **Architect** has not specifically requested to observe prior to its being covered, the **Architect** may request to see such Work, and it shall be uncovered by the **Contractor**. If it is found that such Work is in accordance with the Contract Documents, costs of uncovering and replacing shall, by appropriate Change Order, be charged to the **City**. If it is found that such Work is defective or not in accordance with the Contract Documents, the **Contractor** shall pay all claims, costs, losses, and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection, and testing and of satisfactory replacement or reconstruction (including, but not limited to, all costs of repair or replacement of work of others); and the **City** shall be entitled to an appropriate decrease in the Contract Sum. The **City** may take such decrease by reducing the then current application for payment accordingly or subsequent applications, if necessary, until the decrease is paid in full.

10.2. Correcting Work.

10.2.1. The **Contractor** shall promptly correct Work rejected by the **Architect** or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. The **Contractor** shall bear all costs of correcting such

rejected Work including additional testing and inspections and compensation for the **Architect's** services and expenses made necessary thereby and any cost, loss, or damages to the **City** resulting from such failure or defect.

10.2.2. If, within one (1) year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established in Article 15, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the **City** to do so, unless the **City** has previously given the **Contractor** a written acceptance of such condition. This period of one (1) year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation to correct under this paragraph shall survive acceptance of the Work under the Contract and termination of the Contract. The **City** shall give such notice promptly after discovery of the condition.

10.2.3. The **Contractor** shall correct, remove, or replace portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the **Contractor** nor accepted by the **City**.

10.2.4. If the **Contractor** fails within a reasonable time to correct nonconforming Work, or to remove and replace rejected Work, or fails to perform the Work in accordance with the Contract Documents, the **City** may correct it in accordance with the provisions herein. If the **Contractor** does not proceed with correction, removal, or replacement of such nonconforming Work within seven (7) days from the date of written notice from the **Architect**, the **City** may correct it and store any salvable materials or equipment at the **Contractor's** expense. If the **Contractor** does not pay costs of any such removal and storage within ten (10) days after written notice, the **City** may upon ten (10) additional days' written notice sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the **Contractor**, including compensation for the **Architect's** services and expenses made necessary thereby. If such proceeds of sale do not cover all the costs which the **Contractor** should have borne, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the **Contractor** are not sufficient to cover such amount, the **Contractor** shall pay the difference to the **City**.

10.2.5. The **Contractor** shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the **City** or separate contractors caused by the **Contractor's** correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

10.2.6. Nothing contained in this paragraph shall be construed to establish a period of limitation with respect to other obligations which the **Contractor** might have under the Contract Documents. Establishment of the time period of one (1) year as described in the above paragraph related only to the specific obligation of the **Contractor** to correct the Work and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced nor to the time within which proceedings may be commenced to establish the **Contractor's** liability with respect to the **Contractor's** obligations other than specifically to correct the Work.

10.3. Acceptance of Nonconforming Work.

10.3.1. If, instead of requiring correction or removal and replacement of defective or nonconforming Work, the **City** prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the **City** may do so instead of requiring its removal and correction, in which case the **Contractor** shall pay all claims, costs, losses, and damages attributable to the **City's** evaluation of and determination to accept such defective or nonconforming Work. The Contract Sum will be reduced as appropriate. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 11 CHANGES IN THE WORK

11.1. In General.

11.1.1. The Contract Sum constitutes the total compensation (subject to authorized adjustments) payable to the **Contractor** for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by the **Contractor** shall be at the **Contractor's** expense without any change in the Contract Sum.

11.1.2. Without invalidating the Contract and without notice to any surety, the **City** may, at any time or from time to time, order additions to, deletions from, or revisions in the Work. Such additions, deletions, or revisions will be authorized by a Change Order, a Modification or a Work Change Directive. Upon receipt of any such document, the **Contractor** shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

11.1.3. The **Contractor** shall not be entitled to an increase in the Contract Sum or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified, or supplemented, except as otherwise provided herein.

11.2. Change Orders.

11.2.1. (*Reference: M.G.L. c.30, §39I*). The **Contractor** shall perform all the Work required by this Contract in conformity with the Drawings and Specifications contained herein. No willful and substantial deviation from said Drawings and Specifications shall be made unless authorized in writing by the **Architect** and the **City** in charge of the Work who is duly authorized by the **City** to approve such deviations. In order to avoid delays in the prosecution of the Work required by such Contract, such deviation from the Drawings or Specifications may be authorized by a written order of the **City** or the **Architect** so authorized to approve such deviation. Within thirty (30) days thereafter, such written order shall be confirmed by a certificate of the **City** stating: (1) If such deviation involves any substitution or elimination of materials, fixtures or equipment, the reasons why such materials, fixtures, or equipment were included in the first instance and the reasons for substitution or elimination, and, if the deviation is of any other nature, the reasons for such deviation, giving justification therefor; (2) that the specified deviation does not materially injure the Project as a whole; (3) that either the work substituted for the Work specified is of the same cost and quality, or that an equitable adjustment has been agreed upon between the **City** and the **Contractor** and the amount in dollars of said adjustment; and (4) that the deviation is in the best interest of the **City**.

11.3. Work Change Directive.

11.3.1. A Work Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

11.3.2. Upon request of the **City** or the **Architect**, the **Contractor** shall without cost to the **City** submit to the **Architect** in such form as the **Architect** may require, an accurate written estimate of the cost of any proposed extra work or change. The estimate shall indicate the quantity and unit cost of each item of materials, and the number of hours of work and hourly rate for each class of labor, as well as the description and amounts of all other costs chargeable under the terms of this Article. Unit labor costs for the installation of each item of materials shall be shown if required by the **Architect**. If required by the **Architect**, in order to establish the exact cost of new Work added or of previously required Work omitted, the **Contractor** shall obtain and furnish to the **Architect** bona fide proposals from recognized Suppliers for furnishing any material included in such Work. Such estimates shall be furnished promptly so as to occasion no delay in the Work, and shall be furnished at the **Contractor's** expense.

11.3.3. The **Contractor** shall state in the estimate any extension of time required for the completion of the Work if the change or extra Work is ordered. The **Contractor** shall document, through a critical path

analysis, or some other clearly delineated explanation, how the proposed change affects other aspects of the Work, and why it would require an extension of time. The **Contractor** shall promptly revise and resubmit such estimate if the **Architect** determines that it is not in compliance with the requirements of this Article, or that it contains errors of fact or mathematical errors.

11.3.4. If the Work Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods, as selected by the **City**, selection of which does not require the consent of the **Contractor**:

11.3.4.1. By unit prices stated in the Contract Documents or otherwise mutually agreed upon.

11.3.4.2. By Cost and Percentages estimated by the **Contractor** as provided herein and accepted by the **City**; the **Contractor's** estimate shall become a fixed price which shall not be changed by any variation in the actual cost of executing the Work covered by the change.

11.3.4.3. By actual Cost determined after the Work covered by the change is completed, plus Percentage.

11.3.4.4. By submission to arbitration or a court, which shall determine the fair value of the Work covered by the change.

11.3.5. As used in this paragraph, "Cost" shall mean the estimated or actual net increase or decrease in cost to the **Contractor**, Subcontractor, or Sub-subcontractor for performing the Work covered by the change, including actual payments for materials, equipment rentals, expendable items, wages, and associated benefits to the workers and to supervisors employed full time at the Site, insurance, bonds, and other provable direct costs, but not including any administrative, accounting or expediting costs, or other indirect or overhead costs, or any wages or benefits of supervisory personnel not assigned full time to the Site, or any amount for profit or fee to the **Contractor**, Subcontractor, or Sub-subcontractor.

11.3.6. "Percentage" shall mean an allowance to be added to or subtracted from the Cost in lieu of overhead and profit and of any other expense which is not included in the Cost of the Work covered by the change, as defined above. Percentage for a Sub-subcontractor shall be 8% of any net increase or decrease of Cost of any Work performed by the Sub-subcontractor's own forces plus 4% of any net increase or decrease in Cost of any Work performed for the Sub-subcontractor by lower tier Sub-subcontractors. Percentage for a Subcontractor shall be 12% of any net increase or decrease of Cost of any Work performed by the Subcontractor's own forces plus 4% of the Cost of Work performed by Sub-subcontractors. Percentage for the **Contractor** shall be 15% of any net increase or decrease of Cost of any Work performed by the **Contractor's** own forces plus 5% of any net increase or decrease in the Cost for all other Work covered by the change. When the **Contractor** is also performing Work as a Subcontractor or Sub-subcontractor, the **Contractor** shall only be entitled to a total of no more than 15% of any net increase or decrease of Cost of any Work.

11.3.7. When in the reasonable judgment of the **Architect** a series of Work Change Directives or Change Orders effect a single change, Percentage shall be calculated on the cumulative net increase or decrease in Cost, if any.

11.3.8. If unit prices are stated in the Contract Documents or are subsequently agreed upon, and if quantities originally contemplated are so changed in a Proposed Change Order or Work Change Directive that the application of such unit prices to quantities of Work proposed will cause substantial inequity to the **City** or the **Contractor**, the applicable unit prices shall be equitably adjusted.

11.3.9. If the **City** elects to determine the Cost of the Work as provided in 11.3.4.1 using unit prices stated in the Contract Documents or subsequently agreed upon, the unit prices shall be subject to the prior paragraph. Notwithstanding the inclusion of unit prices in the Contract Documents, it shall be the **City's** option to require the Cost of any given change to be determined by one of the other methods stated

in 11.3.4. If the **City** elected to determine the Cost of the change by unit prices and the nature of the work is such that its extent cannot readily be measured after the completion of such work or any subsequent Work, the **Contractor** shall keep daily records, available at all times to the **Architect** for inspection, of the actual quantities of such Work put in place, and delivery receipts or other adequate evidence, acceptable to the **Architect**, indicating the quantities of materials delivered to the Site for use in such unit price Work, and distinguishing such from other similar material delivered for use in Work included in the base Contract Sum. If so required by the **Architect**, materials for use in unit price Work shall be stored apart from all other materials on the Project.

11.3.10. If the **City** elects to determine the Cost of the Work as provided in methods 11.3.4.3. or 11.3.4.4. or if the method of determining the Cost has not been established before the Work is begun, the **Contractor** shall keep detailed daily records of labor and material costs applicable to the Work.

11.3.11. Upon receipt of a Work Change Directive, the **Contractor** shall promptly proceed with the change in the Work involved and advise the **Architect** in writing of the **Contractor's** agreement or disagreement with the method, if any, provided in the Work Change Directive for determining the proposed adjustment in the Contract Time.

11.3.12. A Work Change Directive signed by the **Contractor** indicates the agreement of the **Contractor** therewith, including adjustment in the Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

11.3.13. If the **Architect** and the **Contractor** do not agree with the adjustment in the Contract Time or the method for determining it, the adjustment or the method shall be referred to the **Architect** for determination.

11.4. Minor Changes in the Work.

11.4.1. The **Architect** has the authority to order minor changes in the Work. "Minor changes" as used in this paragraph mean changes which are so insignificant as to not affect the Contract Sum or the Contract Time and which are not inconsistent with the intent of the Contract Documents. Any minor change shall be committed to a written order which shall be binding on both the **City** and the **Contractor** and which shall be promptly carried out by the **Contractor**.

11.5. Certificate of Appropriations.

11.5.1. (Reference: M.G.L. c.44, §31C). This Contract shall not be deemed to have been made until the **City's** auditor has certified thereon that an appropriation in the amount of this Contract is available therefor and that an officer or agent of the **City** has been authorized to execute said Contract and approve all requisitions and change orders. No order to the **Contractor** for a change in or addition to the Work, whether in the form of a drawing, plan, detail or any other written instruction, unless it is an order which the **Contractor** is willing to perform without any increase to the Contract price, shall be deemed to be given until the auditor has certified thereon that an appropriation in the amount of such order is available therefore; but such certificate shall not be construed as an admission by the **City** of its liability to pay for such work. The certificate of the auditor that an appropriation in the amount of this Contract or in the amount of such order is available shall bar any defense by the **City** on the grounds of insufficient appropriation.

ARTICLE 12 CHANGE IN THE CONTRACT TIME

12.1. Date of Commencement.

12.1.1. The date of commencement of the Work is the date established in the Notice to Proceed. The date shall not be postponed by the failure to act of the **Contractor** or persons or entities for whom the

Contractor is responsible.

12.2. Progress and Completion.

12.2.1. Time is of the essence; all time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the **Contractor** confirms that the Contract Time is a reasonable period for performing the Work.

12.2.2. The **Contractor** shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

12.2.3. At least ten (10) working days before the first application for payment, the **Contractor** shall submit to the **Architect** a progress schedule showing for each class of Work included in the schedule of values, the percentage of completion to be obtained and the total dollar value of Work to be completed as of the first of each month until Substantial Completion. All calculations shall be on the basis of Work in place, but may include, at the **Architect's** discretion, the value of materials delivered but not in place.

12.2.4. The progress schedule shall be based on an orderly progression of the Work, allowing adequate time for each operation (including adequate time for submission and review of submittals), and leading to a reasonable certainty of Substantial Completion by the date established in the Agreement. The progress schedule will be reviewed by the **Architect** for compliance with the requirements of this Article and will be accepted by the **Architect** or returned to the **Contractor** for revision and resubmittal. Unless specifically required by law, no payment under this Contract shall be due until the progress schedule has been approved by the **Architect**. The **Architect's** review of the progress schedule shall not impose any duty on the **Architect** or the **City** with respect to the timing, planning, scheduling, or execution of the Work. In particular, if the **Contractor** proposes a progress schedule indicating a date of Substantial Completion which is earlier than the Contract Time, the **Contractor** shall not be entitled to additional payment or compensation of any kind if, for any reason, the full Contract Time is required to achieve Substantial Completion of the Work.

12.2.5. If in any Application for Payment, the total value of the completed Work in place, as certified by the **Architect**, is less than 90% of the total value of the Work in place estimated in the progress schedule, the **City** may, at the **City's** option, require the **Contractor** to accelerate the progress of the Work without cost to the **City** by increasing the workforce or hours of work or by other reasonable means approved by the **Architect**.

12.2.6. If each of three successive applications, as certified by the **Architect**, indicate that the actual Work completed is less than 90% of the values estimated in the progress schedule to be completed by the respective dates, the **City** may at the **City's** option, treat the **Contractor's** delinquency as a default justifying the action permitted under Article 18.

12.2.7. If the **Architect** has determined that the **Contractor** should be permitted to extend the time for completion as provided below, the calendar dates in the progress schedule shall be adjusted accordingly to retain their same relationship to the adjusted date of Substantial Completion, and the dollar value of the Work to be completed as of the first of each month shall be adjusted pro rata.

12.2.8. If the **Contractor** fails to submit any application for payment in any month, the **Architect** shall, for the purpose of this evaluation of progress, certify separately to the actual value of the Work in place completed as of the first of the month to the best of the **Architect's** knowledge.

12.2.9. Nothing herein shall limit the **City's** right to liquidated or other damages for delays by the **Contractor** or to any other remedy which the **City** may be entitled or may possess under other provisions of the Contract Documents or by law.

12.3. Delays and Extensions of Time.

12.3.1. If the **Contractor** is delayed at any time in the progress of the Work by an act or neglect of the **City** or the **Architect**, or of an employee of either, or of a separate contractor employed by the **City**, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, or other causes (except weather) beyond the **Contractor's** control, or by delay authorized by the **City**, or by other causes which the **Architect** determines may justify delay, then the Contract Time shall be extended by Change Order or Work Change Directive for such reasonable time as the **Architect** may determine.

12.3.2. Claims relating to time shall be made in accordance with applicable provisions of Article 16.

12.3.3. No claim for extension of time shall be allowed on account of failure of the **Architect** to furnish Drawings, Specifications or instructions or to return Shop Drawings or Samples until fifteen (15) days after receipt by the **Architect** by registered or certified mail of written demand for such instructions, Drawings, Specifications, or Samples, and then not unless such claim is reasonable.

12.3.4. No extensions of time shall be granted because of seasonal or abnormal variations in temperature, humidity or precipitation, which conditions shall be wholly at the risk of the **Contractor**, whether occurring within the time originally scheduled for completion or within the period of any extension granted. There shall be no increase in the Contract Sum on account of any additional costs of operations or conditions resulting therefrom.

12.3.5. The **Contractor** hereby agrees that the **Contractor** shall have no claim for damages of any kind against the **City** or the **Architect** on account of any delay in the commencement of the Work and/or any hindrance, delay, or suspension of any portion of the Work, whether such delay is caused by the **City**, the **Architect**, or otherwise, except as and to the extent expressly provided under M.G.L. c. 30, §39O, in the case of written orders by the **City**. The **Contractor** acknowledges that the **Contractor's** sole remedy for any such delay and/or suspension will be an extension of time as provided in this Article.

12.3.6. (Reference: M.G.L. c.30, §39O). (a) The **City** may order the **Contractor** in writing to suspend, delay, or interrupt all or any part of the Work for such period of time as it may determine to be appropriate for the convenience of the **City**, provided however that if there is a suspension, delay, or interruption for fifteen (15) days or more due to a failure of the **City** to act within the time specified in this Contract, the **City** shall make an adjustment in the Contract prices for any increase in the cost of performance of this Contract but shall not include any profit to the Contractor on such increase; and provided, further, that the **City** shall not make adjustment in the Contract price under this provision for any suspension, delay, interruption, or failure to act to the extent that such is due to any cause for which this Contract provides for an equitable adjustment of the Contract price under any other Contract provisions. (b) The **Contractor** must submit the amount of a claim under provision (a) to the **City** in writing as soon as practicable after the end of the suspension, delay, interruption, or failure to act and, in any event, not later than the date of final payment under this Contract and, except for costs due to a suspension order, the **City** shall not approve any costs in the claim incurred more than twenty (20) days before the **Contractor** notified the **City** in writing of the act or a failure to act involved in the Claim.

In the event a suspension, delay, interruption, or failure to act of the **City** increases the cost of performance to any Subcontractor, that Subcontractor shall have the same rights against the **Contractor** for payment for an increase in the cost of its performance as provisions (a) and (b) give the **Contractor** against the **City**, but nothing in provisions (a) and (b) shall in any way change, modify, or alter any other rights which the **Contractor** or the Subcontractor may have against each other.

12.4. Liquidated Damages.

12.4.1. If the **Contractor** shall fail to achieve Substantial Completion within the Contract Time, it shall be

liable to pay the **City** the daily amount specified in the Agreement, not as a penalty, but as fixed and agreed upon damages for breach of contract. The said amount is fixed and agreed upon because of the difficulty of ascertaining the **City's** actual damages. It is mutually understood that the said amount is a reasonable approximation or estimate thereof as of the date of the Agreement. The **City** may elect to withhold said amount from periodic or final payments due to the **Contractor**, in addition to retainage and other back charges.

12.5. Changes in the Contract Time.

12.5.1. How. The Contract Time may only be changed by a Change Order or a Modification. Any claim for an adjustment of the Contract Time shall be based on a written notice delivered to the party making the claim to the other party and to the **Architect** promptly (but in no event later than seven (7) days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within thirty (30) days after such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Time shall be determined by the **Architect** in accordance with Article 16. No claim for an adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph.

12.5.2. Early Completion. The Contract Time shall not be changed due to a delay in the **Contractor's** early completion date.

ARTICLE 13 PAYMENTS

13.1. Schedule of Values.

13.1.1. The **Contractor** shall submit to the **Architect** a schedule of values which shall subdivide the Work into its component parts and shall include quantities, direct craft labor worker hours, labor cost and material/equipment cost. Labor cost shall include an appropriate amount of construction equipment costs, supplemental costs, administrative expenses, contingencies, and profit. The **Contractor** shall prepare the schedule of values in such form and supported by such data to substantiate its accuracy as the **Architect** may require and shall be revised if later found by the **Architect** to be inaccurate. This schedule, unless objected to by the **Architect**, shall be used as a basis for reviewing the **Contractor's** applications for payment.

13.2. Content and Submission of Applications for Payment.

13.2.1. At least ten (10) days before the date established for each progress payment, the **Contractor** shall submit to the **Architect** six (6) copies of an itemized application for payment for Work completed in accordance with the schedule of values. Such application shall be in a form or format established or approved by the **Architect** and shall be supported by documentation substantiating the **Contractor's** right to payment.

13.2.2. When Work Change Directives have set forth an adjustment to the Contract Sum but have not yet been included in Change Orders, the value established by the **City** may be included in the application.

13.2.3. Applications covering Work of Subcontractors or Suppliers shall not include requests for payments of amounts the **Contractor** does not intend to pay to a Subcontractor or Supplier because of a dispute or other reason. The **Contractor** shall not be paid for any Work performed by a Subcontractor unless and until the **City** receives for that Subcontractor a certificate of insurance which conforms to the requirements of the Contract Documents .

13.2.4. Unless otherwise provided in the Contract Documents, payments shall be made on account of

materials and equipment delivered and suitably stored at the Site for subsequent incorporation in the Work. If approved in advance by the **City**, payment may similarly be made for materials and equipment suitably stored off the Site at a location agreed upon in writing. Payment for materials and equipment stored on or off the Site shall be conditioned upon the application for payment being accompanied by a bill of sale, an invoice, or other documentation warranting that the **City** has received the materials and equipment free and clear of all liens, claims, security interests, or encumbrances, hereinafter collectively referred to as "liens," and evidence that the materials and equipment are covered by appropriate insurance and other arrangements to protect the **City's** interest therein.

13.2.5. Each application for payment or periodic estimate requesting payment shall be accompanied by, at the **City's** option, a certificate from each Subcontractor stating that the Subcontractor has been paid all amounts due the Subcontractor on the basis of the previous periodic payment to the **Contractor**, or else stating the amount not so paid and the reason for the discrepancy. In the event of any such discrepancy, the **Contractor** shall furnish the **Contractor's** own written explanation to the **City** through the **Architect**. Such waiver or certificate shall be in a form acceptable to the **City**.

13.3. False Applications for Payment.

13.3.1. (*Reference: M.G.L. c.93, §9B*). Any person who shall make or cause to be made, or present or cause to be presented, for payment or approval, to or by any employee, department, or agency, any claim upon or against any department or agency, knowing such claim to be false, fictitious or fraudulent, or who, for the purpose of obtaining or aiding to obtain the payment or approval of such claim, makes, uses, or causes to be made or used, any false bill, receipt, voucher, toll, account, claim, certificate, affidavit, or deposition knowing the same to contain any fraudulent or fictitious statement or entry, shall forfeit and pay to the **City** the sum of two thousand dollars (\$2,000.00) and, in addition, double the amount of damages which the **City** may have sustained by reason of the doing or committing of such act, together with the costs of the action.

13.4. Review of Applications for Payment.

13.4.1. The **Architect** shall review each application for payment and will reject any application that (1) is not accompanied by the required documentation or (2) contains errors, mathematical or otherwise.

13.4.2. Within five (5) business days after receipt of an application for payment, the **Architect** will either (1) return the application to the **Contractor** with a written explanation as to why it was rejected or (2) issue to the **City** a certificate for payment, with a copy to the **Contractor**, for such amount as the **Architect** determines is properly due. In the event an application is returned to the **Contractor**, the date of receipt of the application shall be the date of receipt of the corrected application.

13.4.3. The **Architect** or the **City** may make changes to any application submitted by the **Contractor**.

13.4.4. By recommending any payment, the **Architect** will not thereby be deemed to have represented that: (1) exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to the **Architect** in the Contract Documents or (2) that there may not be other matters or issues between the parties that might entitle the **Contractor** to be paid additionally by the **City** or entitle the **City** to withhold payment to the **Contractor**. The **Architect's** approval of the application for payment and the accompanying documentation shall indicate that to the best of the **Architect's** knowledge, information, and belief, the Work has progressed to the point indicated by the **Contractor**, and that the quality of the Work is in accordance with the Contract Documents, subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests specified in the Contract Documents, final determination of quantities and classifications for unit price work and any other qualifications so stated.

13.4.5. The **Architect's** recommendation of any payment shall not mean that the **Architect** is responsible for the **Contractor's** means, methods, techniques, sequences, or procedures of construction, or the

safety precautions and programs incident thereto, or for any failure of the **Contractor** to comply with laws and regulations applicable to the furnishing or performance of Work, or for any failure of the **Contractor** to perform or furnish Work in accordance with the Contract Documents.

13.4.6. No certificate given or payment made shall be evidence of the performance of this Contract, either wholly or in part and no payment, whether made upon the final certificate or otherwise, shall be construed as an acceptance of defective work or materials.

13.5. Decisions to Withhold Certification.

13.5.1. The **Architect** may refuse to recommend the whole or any part of any payment if, in the **Architect's** opinion, it would be incorrect to make the representations to the **City** referred to above.

13.5.2. If the **Contractor** and the **Architect** cannot agree on a revised amount, the **Architect** will promptly approve a certificate for payment for the amount for which the **Architect** is able to make such representations to the **City**. The **Architect** may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a certificate for payment previously issued, to such extent as may be necessary in the **Architect's** opinion to protect the **City** from loss because of:

13.5.2.1. defective Work not remedied;

13.5.2.2. third party claims filed or reasonable evidence indicating probable filing of such claims;

13.5.2.3. failure of the **Contractor** to make payments properly to Subcontractors or for labor, materials or equipment;

13.5.2.4. reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

13.5.2.5. damage to the **City** or another contractor;

13.5.2.6. reasonable evidence that the Work will not be completed within the Contract Time, and that retainage currently held by the **City** would not be adequate to cover actual or liquidated damage for the anticipated delay;

13.5.2.7. persistent failure to carry out the Work in accordance with the Contract Documents; or

13.5.2.8. failure of mechanical, electrical, plumbing, fire protection, security, or technology trade subcontractors to comply with mandatory requirements for maintaining record drawings. The **Contractor** shall check record drawings of subcontractors each month. Written confirmation that the record drawings are current will be required by the **Architect** before approval of the **Contractor's** monthly payment requisition.

13.5.3. When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

13.6. Progress Payments.

13.6.1. After the **Architect** has issued a certificate for payment, the **City** shall make payment in the manner and within the time provided in the Contract Documents.

13.6.2. (*Reference:* M.G.L. c30 §39K). Within fifteen (15) days after the receipt from the **Contractor**, at the place designated by the **City** if such a place is so designated, of a periodic estimate requesting payment of the amount due for the preceding month, the **City** will make a periodic payment to the

Contractor for the Work performed during the preceding month and for the materials not incorporated in the Work but delivered and suitably stored at the Site (or some location agreed upon in writing) to which the **Contractor** has title or to which a Subcontractor has title and has authorized the **Contractor** to transfer title to the **City** less (1) a retention based on its estimate of the fair value of its claims against the **Contractor** and less (2) a retention for direct payments to Subcontractors based on demands for same in accordance with the provisions of M.G.L. c.30 §39F and less (3) a retention not exceeding five percent (5%) of the approved amount of the periodic payment. After the receipt of a periodic estimate requesting final payment and within sixty-five (65) days after (a) the **Contractor** fully completes the Work or substantially completes the Work so that the value of the Work remaining to be done is, in the estimate of the **City**, less than one percent (1%) of the original Contract price, or (b) the **Contractor** substantially completes the Work and the **City** takes possession for occupancy, whichever occurs first, the **City** shall pay the **Contractor** the entire balance due on the Contract less (1) a retention based on its estimate of the fair value of its claims against the **Contractor** and of the cost of completing the incomplete and unsatisfactory items of Work and less (2) a retention for direct payments to subcontractors based on demand for same in accordance with the provisions of M.G.L. c. 30, §39F, or based on the record of payments by the **Contractor** to the Subcontractors under this Contract if such record of payment indicates that the **Contractor** has not paid Subcontractors as provided in M.G.L. c. 30, §39F. If the **City** fails to make payment as herein provided there shall be added to each such payment daily interest at the rate of three percentage points above the rediscount rate then charged by the Federal Reserve Bank of Boston commencing on the first day after said payment is due and continuing until the payment is delivered or mailed to the **Contractor**; provided, that no interest shall be due, in any event, on the amount due on a periodic estimate for final payment until fifteen (15) days after receipt of such periodic estimate from the **Contractor**, at the place designated by the **City** if such a place is so designated. The **Contractor** agrees to pay to each Subcontractor a portion of any such interest paid in accordance with the amount due each Subcontractor.

13.6.3. The **City** may make changes in any periodic estimate submitted by the **Contractor**, and the payment due on said periodic estimate shall be computed in accordance with the changes so made, but such changes or any requirement for a corrected periodic estimate shall not affect the due date for the periodic payment or the date for the commencement of interest charges on the amount of the periodic payment computed in accordance with the changes made, as provided herein; provided, that the **City** may, within seven (7) days after receipt, return to the **Contractor** for correction, any periodic estimate which is not in the required form or which contains computations not arithmetically correct and, in that event, the date of receipt of such periodic estimate shall be the date of receipt of the correct periodic estimate in proper form and with arithmetically correct computations. The date of receipt of a periodic estimate received on a Saturday, Sunday, or legal holiday shall be the first working day thereafter.

13.6.4. All periodic estimates shall be submitted to the **City**, or to its designee as set forth in writing to the **Contractor**, and the date of receipt by the **City** or its designee shall be marked on the estimate. All periodic estimates shall contain a separate item for each filed subtrade and each sub-subtrade listed in the sub-bid form as required by specifications and a column listing the amount paid to each subcontractor and sub-subcontractor as of the date the periodic estimate is filed. The person making payment for the **City** shall add the daily interest provided for herein to each payment for each day beyond the due date based on the date of receipt marked on the estimate.

13.6.5. A certificate of the **Architect** to the effect that the **Contractor** has fully or substantially completed the Work shall, subject to the provisions of M.G.L. c.30, §39J, be conclusive for the purposes of M.G.L. c. 30, §39K.

13.7. Final Payment.

13.7.1. After final inspection and after the **Contractor** has completed all the required corrections to the satisfaction of the **Architect** and the **City** and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, bonds, certificates, or other evidence of insurance, certificates of inspection, marked-up record documents, and all other documents called for in

the Contract Documents, as well as any surplus materials requested by the **City**, the **Contractor** may make an application for final payment as provided below.

13.7.2. The making and acceptance of final payment will constitute a waiver of all claims by the **Contractor** against the **City** other than those previously made in writing and still unsettled.

13.8. Payments to Subcontractors.

13.8.1. Neither the **City** nor the **Architect** shall have an obligation to pay or see to the payment of money to a Subcontractor, Sub-subcontractor, or Supplier except as may otherwise be required by law.

13.8.2. (*Reference: M.G.L. c.30, §39F*).

(1)(a) Forthwith after the **Contractor** receives payment on account of a periodic estimate, the **Contractor** shall pay to each Subcontractor the amount paid for the labor performed and the materials furnished by that Subcontractor, less any amount specified in any court proceedings barring such payment and also less any amount claimed due from the Subcontractor by the **Contractor**. (b) Not later than the sixty-fifth day after each Subcontractor substantially completes its Work in accordance with the Drawings and Specifications, the entire balance due under the subcontract, less amounts retained by the **City** as the estimated cost of completing the incomplete and unsatisfactory items of Work, shall be due the Subcontractor; and the **City** shall pay that amount to the **Contractor**. The **Contractor** shall forthwith pay to the Subcontractor the full amount received from the **City** less any amount specified in any court proceeding barring such payment and also less any amount claimed due from the Subcontractor by the **Contractor**. (c) Each payment made by the **City** to the **Contractor** pursuant to paragraphs (a) and (b) of M.G.L. c. 30, §39F(1), for the labor performed and the materials furnished by a Subcontractor shall be made to the **Contractor** for the account of that Subcontractor; and the **City** shall take reasonable steps to compel the **Contractor** to make each such payment to each such Subcontractor. If the **City** has received a demand for direct payment from a Subcontractor for any amount which has already been included in a payment to the **Contractor** or which is to be included in a payment to the **Contractor** for payment to the Subcontractor as provided in paragraphs (a) and (b) of M.G.L. c. 30, §39F(1), the **City** shall act upon the demand as provided in M.G.L. c. 30, §39F. (d) If, within seventy (70) days after the Subcontractor has substantially completed the subcontract Work, the Subcontractor has not received from the **Contractor** the balance due under the subcontract including any amount due for extra labor and materials furnished to the **Contractor**, less any amount retained by the **City** as the estimated cost of completing the incomplete and unsatisfactory items of Work, the Subcontractor may demand direct payment of that balance from the **City**. The demand shall be by a sworn statement delivered to or sent by certified mail to the **City**, and a copy shall be delivered to or sent by certified mail to the **Contractor** at the same time. The demand shall contain a detailed breakdown of the balance due under the subcontract and also a statement of the status of completion of the subcontract Work. [The demand letter shall indicate the certified mail number assigned by the postal service or the date of delivery to the **Contractor**.] Any demand made after substantial completion of the subcontract Work shall be valid even if delivered or mailed prior to the seventieth day after the Subcontractor has substantially completed the subcontract Work. Within ten (10) days after the Subcontractor has delivered or so mailed the demand to the **City** and delivered or so mailed a copy to the **Contractor**, the **Contractor** may reply to the demand. The reply shall be by a sworn statement delivered to or sent by certified mail to the **City**, and a copy shall be delivered to or sent by certified mail to the Subcontractor at the same time. The reply shall contain a detailed breakdown of the balance due under the subcontract, including any amount due for extra labor and materials furnished to the **Contractor** and of the amount due for each claim made by the **Contractor** against the Subcontractor. (e) Within fifteen (15) days after receipt of the demand by the **City**, but in no event prior to the seventieth day after substantial completion of the subcontract Work, the **City** shall make direct payment to the Subcontractor of the balance due under the subcontract, including any amount due for extra labor and materials furnished to the **Contractor**,

less any amount (i) retained by the **City** as the estimated cost of completing the incomplete or unsatisfactory items of Work, (ii) specified in any court proceedings barring such payment, or (iii) disputed by the **Contractor** in the sworn reply; provided that the **City** shall not deduct from a direct payment any amount as provided in part (iii) if the reply is not sworn to, or for which the sworn reply does not contain the detailed breakdown required by subparagraph (d) above. The **City** shall make further direct payments to the Subcontractor forthwith after the removal of the basis for deductions from direct payments made as provided in parts (i) and (ii) of this paragraph.

(f) The **City** shall forthwith deposit the amount deducted from a direct payment as provided in part (iii) of subparagraph (e) above in an interest-bearing joint account in the names of the **Contractor** and the Subcontractor in a bank in Massachusetts selected by the **City** or agreed upon by the **Contractor** and the Subcontractor and shall notify the **Contractor** and the Subcontractor of the date of the deposit and the bank receiving the deposit. The bank shall pay the amount in the account, including accrued interest, as provided in an agreement between the **Contractor** and the Subcontractor or as determined by decree of a court of competent jurisdiction. (g) All direct payments and all deductions from demands for direct payments deposited in an interest-bearing account or accounts in a bank pursuant to the previous paragraph shall be made out of amounts payable to the **Contractor** at the time of receipt of a demand for direct payment from a Subcontractor and out of amounts which later become payable to the **Contractor** and in the order of receipt of such demands from Subcontractors. All direct payments shall discharge the obligation of the **City** to the **Contractor** to the extent of such payment. (h) The **City** shall deduct from payments to a **Contractor** amounts which, together with the deposits in interest-bearing accounts pursuant to paragraph (f), are sufficient to satisfy all unpaid balances of demands for direct payment received from Subcontractors. All such amounts shall be earmarked for such direct payments, and the Subcontractors shall have a right in such deductions prior to any claims against such amounts by creditors of the **Contractor**. (i) If the Subcontractor does not receive payment as provided in paragraph (a) or if the **Contractor** does not submit a periodic estimate for the value of the labor or materials performed or furnished by the Subcontractor and the Subcontractor does not receive payment for same when due less the deductions provided for in paragraph (a), the Subcontractor may demand direct payment by following the procedure in paragraph (d) and the **Contractor** may file a sworn reply as provided in that same paragraph. A demand made after the first day of the month following that for which the Subcontractor performed or furnished the labor and materials for which the Subcontractor seeks payment shall be valid even if delivered or mailed prior to the time payment was due on a periodic estimate from the **Contractor**. Thereafter the **City** shall proceed as provided in paragraphs (e), (f), (g), and (h). "Subcontractor" as used in this paragraph (1)(i) shall mean a person who files a sub-bid and receives a subcontract as a result of that filed sub-bid or who is approved by the **City** in writing as a person performing labor or both performing labor and furnishing materials pursuant to a contract with the **Contractor**.

(2) Any assignment by a Subcontractor of the rights under this section to a surety company furnishing a bond under the provisions of M.G.L. c.149, §29 shall be invalid. The assignment and subrogation rights of the surety to amounts included in a demand for direct payment which are in the possession of the **City** or which are on deposit pursuant to paragraph (g) shall be subordinate to the rights of all Subcontractors who are entitled to be paid under this section and who have not been paid in full.

(3) A **Contractor** or a Subcontractor shall enforce a claim to any portion of the amount of a demand for direct payment deposited as provided in herein by a petition in equity in the superior court against the other and the bank shall not be a necessary party. A Subcontractor shall enforce a claim for direct payment or a right to require a deposit as provided in paragraph (f) by a petition in equity in the superior court against the **City** and the **Contractor** shall not be a necessary party. Upon motion of any party the court shall advance for speedy trial any petition filed as provided in this paragraph. M.G.L. c. 231, §§59 and 59B shall apply to such petitions. The court shall enter an interlocutory decree upon which execution shall issue for any part of a claim found due pursuant to §§59 and 59B and, upon motion of any party, shall advance for

speedy trial the petition to collect the remainder of the claim. Any party aggrieved by such interlocutory decree shall have the right to appeal therefrom as from a final decree. The court shall not consolidate for trial the petition of any Subcontractor with the petition of one or more Subcontractors or the same general contract unless the court finds that a substantial portion of the evidence of the same events during the course of construction (other than the fact that the claims sought to be consolidated arise under the same general contract) is applicable to the petitions sought to be consolidated and that such consolidation will prevent unnecessary duplication of evidence. A decree in any such proceeding shall not include interest on the disputed amount deposited in excess of the interest earned for the period of any such deposit. No person except a Subcontractor filing a demand for direct payment for which no funds due the **Contractor** are available for direct payment shall have a right to file a petition in court of equity against the **City** claiming a demand for direct payment is premature, and such Subcontractor must file the petition before the **City** has made a direct payment to the Subcontractor and has made a deposit of the disputed portion as provided in part (iii) of paragraph (e) and in paragraph (f).

(4) In any petition to collect any claim for which a Subcontractor has filed a demand for direct payment the court shall, upon motion of the **Contractor**, reduce by the amount of any deposit of a disputed amount by the **City** as provided in part (iii) of paragraph (e) and in paragraph (f) any amount held under a trustee writ or pursuant to a restraining order or injunction.

ARTICLE 14 SUBSTANTIAL COMPLETION

14.1. Substantial Completion.

14.1.1. Upon Substantial Completion of the Work, the **Contractor** shall present in writing to the **City** its certification that the Work has been substantially completed and include in its certification (1) a list of items to be completed or corrected, (2) all special warranties required by the Contract Documents, endorsed by the **Contractor** and in a form reasonably acceptable to the **Architect** and (3) the permits and certificates referred to in 13.7.1., or elsewhere. The failure to include any item on the list mentioned in the preceding sentence does not alter the responsibility of the **Contractor** to complete all Work in accordance with the Contract Documents. When the **Architect** on the basis of an inspection determines that the Work or designated portion thereof is substantially complete and the other conditions have been met, the **Architect** will then prepare a certificate of Substantial Completion which shall establish the date of Substantial Completion, shall state the responsibilities of the **City** and the **Contractor** for security, maintenance, heat, utilities, damage to the Work, and insurance, and shall fix the time within which the **Contractor** shall complete the items listed therein. The certificate of Substantial Completion shall be submitted to the **City** and the **Contractor** for their written acceptance of the responsibilities assigned to them in such certificate.

14.1.2. Within twenty-one (21) days after receipt of the certification from the **Contractor**, the **City** shall present to the **Contractor** either a written declaration that the Work has been substantially completed or an itemized list of incomplete or unsatisfactory work items required by the Contract sufficient to demonstrate that the Work has not been substantially completed. The **City** may include with such list a notice setting forth a reasonable time within which the **Contractor** must achieve Substantial Completion of the Work. If the **City** fails to respond, by presentation of a written declaration or itemized list as aforesaid, to the **Contractor's** certification within the twenty-one (21) day period, the **Contractor's** certification shall take effect as the **City's** declaration that the Work has been substantially completed.

14.2. Partial Use of Occupance of the Premises.

14.2.1. The **City** may occupy or use any completed or partially completed portion of the Work at any stage. Such partial occupancy or use may begin whether or not the portion is substantially complete, provided that the respective responsibilities of the **City** and the **Contractor** with respect to payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work, insurance, correction of the

Work, and warranties shall be established by agreement of the **City** and the **Contractor** or, absent such agreement, shall be determined by the **Architect** subject to the right of either party to contest such determination as provided in Article 16.

14.2.2. Immediately prior to such partial occupancy or use, the **City**, the **Contractor** and the **Architect** shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

14.2.3. Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

14.2.4. Within sixty-five (65) days after the effective date of a declaration of Substantial Completion, the **City** shall prepare and send to the **Contractor** for acceptance a Substantial Completion estimate for the quantity and price of the Work done and all but one percent (1%) retainage on that Work, including the quantity, price and all but one percent (1%) retainage for the undisputed part of each item and extra work item in dispute, but excluding the disputed part thereof, less the estimated cost of completing all incomplete and unsatisfactory items and less the total periodic payments made to date for the Work. The **City** shall also deduct from the Substantial Completion estimate an amount equal to the sum of all demands for direct payment filed by Subcontractors and not yet paid to Subcontractors or deposited in joint accounts pursuant to M.G.L. c. 30, §39F.

14.2.5. Within fifteen (15) days after the effective date of the declaration of Substantial Completion, the **City** shall send to the **Contractor** by certified mail, return receipt requested, a complete list of all incomplete or unsatisfactory items, and unless delayed by causes beyond its control, the **Contractor** shall complete all such items within forty-five (45) days after the receipt of such list or before the date for final payment and acceptance, whichever is later. If the **Contractor** fails to complete such Work within such time, the **City** may, subsequent to seven (7) days' written notice to the **Contractor** by certified mail, return receipt requested, terminate the Contract and complete the incomplete or unsatisfactory items and charge the cost of same to the **Contractor**.

14.3. Final Inspection.

14.3.1. Upon written notice from the **Contractor** that the entire Work or an agreed portion thereof is complete, the **Architect** will make a final inspection with the **City** and the **Contractor** and will notify the **Contractor** in writing of all particulars which this inspection reveals that the Work is incomplete or defective. The **Contractor** shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

ARTICLE 15 GUARANTEES AND WARRANTIES

15.1. In General.

15.1.1. All guarantees and warranties specifically called for by the Specifications shall expressly run to the benefit of the **City**.

15.2. Warranties.

15.2.1. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof, unless otherwise provided in the certificate of Substantial Completion.

15.2.2. The **Contractor** warrants that the materials and equipment furnished under the Contract will be new and of recent manufacture unless otherwise specified, and that all Work will be of good quality, free from faults and defects, and in conformance with the Contract Documents. Work not conforming to these

requirements, including substitutions not properly approved and authorized, may be considered defective.

The **Contractor's** warranty excludes remedy for damage or defect caused by abuse, Modifications not executed by the **Contractor**, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the **Architect**, the **Contractor** shall furnish satisfactory evidence as to the kind and quality of material and equipment.

15.2.3. The **Contractor** warrants that title to all Work covered by an application for payment will pass to the **City** either by incorporation in the construction or upon the receipt of payment by the **Contractor**, whichever occurs first, free and clear of all liens. The **Contractor** further agrees that the submission of any application for payment shall conclusively be deemed to waive all liens with respect to said Work to which the **Contractor** may then be entitled, provided that such waiver of the lien rights shall not waive the **Contractor's** right to payment for such Work.

15.2.4. The **Contractor** warrants and guarantees that title to all Work, materials, and equipment covered by any application for payment, whether incorporated in the Project or not, will pass to the **City** no later than the time of payment free and clear of all liens.

15.2.5. No materials or supplies for the Work shall be purchased by the **Contractor** or Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The **Contractor** warrants that it has good title to all materials and supplies used by it in the Work, free from all liens.

15.2.6. The **Contractor** shall indemnify and hold the **City** harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workers, mechanics, material persons, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this Contract. The **Contractor** shall at the **City's** request, furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged, or waived. If the **Contractor** fails to do so, then the **City** may, after having served written notice on the **Contractor** either pay unpaid bills, of which the **City** has written notice, direct, or withhold from the **Contractor's** unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the **Contractor** shall be resumed, in accordance with the terms of this Contract, but in no event shall the provisions of this sentence be construed to impose any obligations on the **City** to either the **Contractor** or its surety. In paying any unpaid bills of the **Contractor**, the **City** shall be deemed the agent of the **Contractor** and any payment so made by the **City** shall be considered as payment made under the Contract by the **City** to the **Contractor** and the **City** shall not be liable to the **Contractor** for any such payment made in good faith.

15.3. Extended Warranties and Guarantees.

15.3.1. Any defective Work that is either corrected or replaced will be warranted and guaranteed for a period of one (1) year from the date of such correction or replacement, except as otherwise stated where the warranted period is extended in accordance with the specifications.

ARTICLE 16 CLAIMS

16.1. In General.

16.1.1. Written Notice. A Claim must be made by written notice to the other party.

16.1.2. Content of Notice. The notice must include all written supporting data.

16.1.3. Burden of Proof. The party making the Claim must substantiate the Claim.

16.2. Time Limits on Claims.

16.2.1. Unless otherwise provided, all Claims must be made within twenty-one (21) days after the occurrence of the event giving rise to such Claim or within twenty-one (21) days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Any change or addition to a previously made Claim shall be made by a written notice within the twenty-one-day period in order to be valid.

16.3. Continuing Contract Performance.

16.3.1. Pending final resolution of a Claim including arbitration, unless otherwise agreed in writing, the **Contractor** shall proceed diligently with performance of the Contract and the **City** shall continue to make payments in accordance with the Contract Documents.

16.4. Types of Claims.

16.4.1. Claims for Differing Subsurface or Latent Physical Conditions. (Reference: M.G.L. c.30, §39N). If, during the progress of the Work, the **Contractor** or the **City** discovers that the actual subsurface or latent physical conditions encountered at the Site differ substantially or materially from those shown on the Drawings or indicated in the Contract Documents, either the **Contractor** or the **City** may request an equitable adjustment in the Contract Sum of the Contract applying to Work affected by the differing Site conditions. A request for such an adjustment shall be in writing and shall be delivered by the party making such claim to the other party as soon as possible after such conditions are discovered. Upon receipt of such a claim from a **Contractor**, or upon its own initiative, the **City** shall make an investigation of such physical conditions, and if they differ substantially or materially from those shown on the Drawings or indicated in the Contract Documents or from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Drawings and Contract Documents and are of such a nature as to cause an increase or decrease in the cost of performance of the Work or a change in the construction methods required for the performance of the Work which results in an increase or decrease in the cost of the Work, the **City** shall make an equitable adjustment in the Contract Sum and the Contract shall be modified in writing accordingly.

16.4.2. Claims for Additional Cost. If the **Contractor** claims that any acts or omissions of the **City** or the **Architect**, including any instructions or orders, whether oral, written, by drawings, or otherwise, involve extra cost or time, and the **Contractor** has not received a written acknowledgment by the **City** or the **Architect** that extra payment will be made or time extended on account thereof, the **Contractor** shall promptly so notify the **Architect** in writing of such Claim and shall proceed with the Work relating to such Claim and all rights of both parties with respect to such Claim shall be deemed to have been reserved. No Claim by the **Contractor** on account of such acts, omissions, instructions, or orders shall be valid unless the **Contractor** has so notified the **Architect** before proceeding.

16.4.2.1. Under no circumstances shall a Claim be made for additional cost where adverse weather conditions are the basis for the Claim.

16.4.3. Claims for Additional Time. If the **Contractor** wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The **Contractor** shall have the burden of demonstrating the effect of the claimed delay on the Contract Time and shall furnish the **Architect** with such documentation relating thereto as the **Architect** may reasonably require. Under no circumstances shall the **Contractor** make a Claim for an increase in the Contract Time due to a change in the **Contractor's** early completion date. If the increase in the Contract Time extends beyond the Contract Time established by the **City**, only the time that so extends beyond the Contract Time shall be reviewed and considered. In the case of a continuing delay, only one Claim is necessary.

16.4.3.1. Under no circumstances shall a Claim be made for additional time where adverse weather conditions are the basis for the Claim.

16.4.4. Claims for Injury to Person or Damage to Property. Should either party to the Contract suffer injury to person or damage to property because of any error, omission, or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, a Claim will be made in writing to the other party within twenty-one (21) days of the occurrence of the act giving rise to the injury or damage.

16.5. Review of Claims.

16.5.1. Initial Referral. All Claims, the bases of which arise prior to final payment or the earlier termination of the Contract, shall be referred initially to the **Architect** for action as provided herein.

16.5.2. Time Period and Action. The **Architect** shall review Claims and shall do one of the following within fourteen (14) days of receipt of the Claim:

16.5.2.1. defer any action with respect to all or any part of a Claim for the purpose of requesting and receiving additional information from either party;

16.5.2.2. decline in writing to render a decision for any reason which it deems appropriate (including, but not limited to, the fact that the Claim involves allegations of fault on the part of the **Architect**); or

16.5.2.3. render a decision on all or a part of the Claim.

16.5.3. If the **Architect** requests additional information, the **Architect** shall take action with respect to the Claim no later than fourteen (14) days after receipt of the additional information. The **Architect** shall notify the parties in writing of its disposition of such Claim. If the **Architect** renders a decision or declines to render a decision, either party may proceed in accordance with paragraph 16.7.

16.6. Decisions.

16.6.1. Decisions by the City or the Architect. (*Reference: M.G.L. c.30, §39P*). In every case in which this Contract requires the **City**, any official, or its **Architect** to make a decision on interpretation of the Specifications, approval of equipment, material or any other approval, or progress of the Work, the decision shall be made promptly and, in any event, no later than thirty (30) days after the written submission for decision; but if such decision requires extended investigation and study, the **City**, the official, or the **Architect** shall, within thirty (30) days after the receipt of the submission, give the party making the submission written notice of the reasons why the decision cannot be made within the thirty (30) period and the date by which the decision will be made.

16.6.2. When Decision of the Architect is Final and Binding. The decision of the **Architect** shall be final and binding on the parties, unless a party files suit or a demand for arbitration within thirty (30) days after the date of the decision.

16.6.3. When Decision of the Architect is Not Final and Binding. (*Reference: M.G.L. c. 30, §39J*). Notwithstanding any contrary provision of this Contract, no decision by the **City** or by the **Architect** on a dispute, whether of fact or of law, arising under said Contract shall be final or conclusive if such decision is made in bad faith, fraudulently, capriciously, arbitrarily, is unsupported by substantial evidence, or is based upon error of law.

16.6.4. Resolved Claims. If a Claim is resolved, the **Architect** shall obtain or prepare the appropriate documentation and provide the **City** and the **Contractor** with a copy of same.

16.7. Arbitration.

16.7.1. Controversies and Claims Subject to Arbitration. Any controversy of Claim arising out of or

related to the Contract, or the breach thereof, shall be settled by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association, and judgment upon the award rendered by the arbitrator or arbitrators may be entered in any court having jurisdiction thereof, except controversies of Claims relating to aesthetic effect, subject to the provisions of paragraph 16.7.7. In any such arbitration in which the amount stated in the demand is \$100,000 or less, the American Arbitration Association shall appoint a single arbitrator in accordance with such Rules, who shall be a lawyer. In any such arbitration in which the amount stated in the demand is in excess of \$100,000, the demand shall include the name of an arbitrator appointed by the claimant. The respondent shall appoint a second arbitrator and shall notify the claimant in writing of such appointment within thirty (30) days of receipt of the demand, failing which the matter shall be decided by the arbitrator named in the claimant's demand. Within thirty (30) days after the claimant's receipt of notice of the appointment of the second arbitrator, the two arbitrators shall appoint a neutral arbitrator and shall notify the parties in writing of such appointment, failing which either party may apply to the American Arbitration Association to appoint such neutral arbitrator. If such neutral arbitrator is appointed by the American Arbitration Association, he or she shall be a lawyer.

16.7.2. Rules for Arbitration. If the neutral arbitrator is appointed by the American Arbitration Association, the said Association shall administer the arbitration and its Construction Industry Arbitration Rules shall govern all aspects of the proceeding including the enforcement of any award. If the neutral arbitrator is not appointed by the American Arbitration Association, then the panel of arbitrators shall act as the administrator of the arbitration but the Construction Industry Arbitration Rules of the Association shall nonetheless govern all aspects of the proceeding, including the enforcement of any award, provided however that the arbitration panel shall have all of the powers and duties conferred on the Association pursuant to said rules. In addition, the following rules shall govern the selection of arbitrators and the proceedings:

16.7.2.1. Neither party may appoint as arbitrator an employee or an owner of that party, nor the parent, spouse, or child of an employee or owner of that party.

16.7.2.2. After the neutral arbitrator has been appointed, neither party may engage in *ex parte* communication with any arbitrator.

16.7.3. When Arbitration May Be Demanded. Demand for arbitration of any Claim, the basis of which arises prior to final payment or the earlier termination of the Contract may not be made before the earlier of (1) the date on which the **Architect** has rendered a written decision on the Claim or has notified the parties in writing that such decision will not be rendered or (2) forty-five (45) days following receipt by the **Architect** of a written request for a decision sent by registered or certified mail to both the **Architect** and the other party to this Contract.

16.7.3.1. In no event shall a demand for arbitration be made after the date when the institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations.

16.7.4. Limitation on Consolidation or Joinder. No arbitration arising out of or relating to the Contract Documents shall include, by consolidation or joinder or in any other manner, the **Architect**, the **Architect's** employees or consultants, except by written consent containing specific reference to the Contract and signed by the **Architect**, the **City**, the **Contractor**, and any other person or entity sought to be joined. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the **City**, the **Contractor**, a separate contractor, and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the **City**, the **Contractor**, or a separate contractor shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a dispute not described therein or with a person or entity so named or described herein. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Contract shall be specifically enforceable under applicable law in any

court having jurisdiction thereof.

16.7.5. Claims and Timely Assertion of Claims. A party who files a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded. When a party fails to include a Claim through oversight, inadvertence, or excusable neglect, or when a Claim has matured or been acquired subsequently, the arbitrator or arbitrators may permit amendment.

16.7.6. Award Final. The award rendered by the arbitrator or arbitrators shall be final, and judgment entered upon it in accordance with applicable law in any court having jurisdiction thereof.

16.7.7. The City's Reservation of Rights. Notwithstanding any provision contained in this Article 16 or elsewhere in the Contract Documents, the **City** reserves the following rights in connection with Claims between the **City** and the **Contractor**, which right may be exercised by the **City** unilaterally, in the **City's** sole discretion, and without the consent of the **Contractor**:

16.7.7.1. the right to institute legal action against the **Contractor** in any court of competent jurisdiction in lieu of demanding arbitration, in which case the dispute or disputes which are the subject of such action shall be decided by such court, and not by arbitration;

16.7.7.2. the right to obtain from any court of competent jurisdiction a stay of any arbitration instituted by the **Contractor**, provided that the application for such stay is made before the appointment of the neutral arbitrator in such arbitration, in which case the dispute or disputes which are the subject of such arbitration shall be decided by such court and not by arbitration;

16.7.7.3. the right to require the **Contractor** to join as a party in any arbitration between the **City** and the **Architect** relating to the Project, in which case the **Contractor** agrees to be bound by the decision of the arbitrator or arbitrators in such arbitration.

16.7.8. In case the **City** elects to proceed in accordance with 16.7.7.1. or 16.7.7.2. above, the word "litigation" shall be deemed to replace the word "arbitration" wherever the latter word appears in the Contract Documents.

ARTICLE 17 EMERGENCIES

17.1. In an emergency affecting the health and safety of persons or property, the **Contractor** shall act to prevent threatened damage, injury, or loss.

17.2. In emergencies affecting the health, safety, or protection of persons, the Work or property at the Site or adjacent thereto, the **Contractor**, without special instruction or authorization from the **City** or the **Architect**, is obligated to act to prevent threatened damage, injury, or loss. The **Contractor** shall give the **Architect** prompt written notice if the **Contractor** believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If the **Architect** determines that a change in the Contract Documents is required because of the action taken by the **Contractor** in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

ARTICLE 18 TERMINATION OR SUSPENSION OF THE CONTRACT

18.1. Suspension by the City.

18.1.1. At any time and without cause, the **City** may suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to the **Contractor** and the **Architect** which will fix the date on which Work will be resumed. The **Contractor** shall resume Work on the date so fixed. The **Contractor** shall be allowed an adjustment in the Contract Sum or an extension of the Contract Time, or both, directly attributable to any such suspension if the **Contractor** makes an approved Claim therefor.

18.1.2. If the Work is defective, if the **Contractor** fails to provide a sufficient number of skilled workers or suitable materials or equipment, or if the **Contractor** defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the **City** to begin and prosecute correction of such default or neglect with diligence and promptness, the **City** may correct such deficiencies, without prejudice to other remedies the **City** may have. In such case, an appropriate Work Change Directive shall be issued deducting from payments then or thereafter due to the **Contractor** the cost of correcting such deficiencies including compensation for the **Architect's** additional services and expenses made necessary by such default, neglect, or failure and any and all direct, indirect, or consequential costs associated with the order to stop the Work. If such payments then or thereafter due the **Contractor** are not sufficient to cover such amounts, the **Contractor** shall immediately pay the difference to the **City**. The **Contractor** shall remain responsible for maintaining progress and shall not be entitled to any increase in the Contract Time or the Contract Sum.

18.2. Termination by the Contractor.

18.2.1. If, through no act or fault of the **Contractor**, a Subcontractor, or a Sub-subcontractor, the Work is suspended for a period of more than ninety (90) days by the **City**, or under an order of court or other public authority, or the **Architect** fails to act on any application for payment within thirty (30) days after it is submitted in proper form and content or the **City** fails for thirty (30) days to pay the **Contractor** any sum finally determined to be due, then the **Contractor** may terminate the Contract upon seven (7) days' written notice to the **City**, provided that the **City** does not remedy such suspension or failure within that time.

18.3. Termination by the City.

18.3.1. If the **Contractor** is adjudged a bankrupt, or if the **Contractor** makes a general assignment for the benefit of the **Contractor's** creditors, or if a receiver is appointed on account of the **Contractor's** insolvency, or if the **Contractor** persistently or repeatedly refuses or fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials, or if the **Contractor** fails to make prompt payment to Subcontractors or for materials or labor, or persistently disregards laws, ordinances, rules, regulations, or orders of any public authority having jurisdiction or disregards an instruction, order, or decision of the **Architect**, or otherwise is guilty of substantial violation of any provision of the Contract, then the **Contractor** shall be in default, and the **City** may, without prejudice to any other right or remedy and upon written notice to the **Contractor**, take possession of all materials, tools, appliances, equipment, construction equipment and machinery and vehicles, offices and other facilities on the Project Site, and all materials intended for the Work, wherever stored, and, seven (7) days after such notice, may terminate the employment of the **Contractor**, accept assignment of any or all subcontracts pursuant to Paragraph 6.6.1.1, and finish the Work by whatever method the **City** may deem expedient. The **City** shall be entitled to collect from the **Contractor** all direct, indirect, and consequential damages suffered by the **City** on account of the **Contractor's** default, including without limitation additional services and expenses of the **Architect** made necessary thereby. The **City** shall be entitled to hold all amounts due to the **Contractor** at the date of termination until all of the **City's** damages have been established, and to apply such amounts to such damages.

ARTICLE 19 AMERICANS WITH DISABILITIES ACT (42 U.S. 12131)

19.1. On July 26, 1994, the Americans with Disabilities Act ("the Act") became effective for employers of fifteen or more employees.

19.2. The Act protects against discrimination on the basis of "disability," which is defined as a physical or mental impairment that substantially limits at least one "major life activity;" or discrimination against an individual who has a record of such impairment; or discrimination against an individual being regarded - even if inaccurately - as having such impairment. The Act also expressly prohibits job discrimination that is based on any individual's relationship or association with a disabled person.

19.3. If the **Contractor** is subject to the Act, it must comply with its provisions.

ARTICLE 20 WRITTEN NOTICE TO THE PARTIES

20.1. In General.

20.1.1. All written communications from the **Architect** to the **Contractor** shall be copied to the **City**. All written communications from the **Contractor** to the **Architect** shall be copied to the **City**. All written communications from the **Contractor** to the **City** shall be copied to the **Architect**.

20.2. Addresses.

20.2.1. To the City. Written notice to the **City** shall be sent or hand-delivered to:

City Manager
City of Lowell
City Hall
375 Merrimack Street, 2nd Floor, Room 43
Lowell, MA 01852

20.2.2. To the Contractor. Both the address given on the bid form upon which the Agreement is founded and the **Contractor's** office at or near the Site of the Work are hereby designated as places to either of which notices, letters, and other communications to the **Contractor** shall be certified, mailed, or delivered. Delivery of any notice, letter, or other communication to the **Contractor** at or depositing same in a postpaid wrapper directed to either place shall be deemed sufficient service thereof upon the **Contractor**. Written notice shall be deemed to have been duly served on the **Contractor** if it is sent or hand-delivered to any member or officer of the **Contractor**. The date of said service shall be the date of such delivery or mailing. The address may be changed at any time by an instrument in writing, executed and acknowledged by the **Contractor** and delivered to the **City** and to the **Architect**. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter, or other communication upon the **Contractor** personally. Moreover, any notice, letter, or other communication required under the Contract may be served on the **Contractor's** representative at job meetings. The **Contractor** shall provide the **City** with its change of address seven (7) days prior to its effective date.

20.2.3. To the Architect. Written notice to the **Architect** shall be sent or hand-delivered to the address appearing on the Project Manual. Written notice shall be deemed to have been duly served on the **Architect** if it is sent or hand-delivered to any member or officer of the **Architect**.

ARTICLE 21 MISCELLANEOUS PROVISIONS

21.1. Governing Law.

21.1.1. This Contract shall be governed by the laws of the Commonwealth of Massachusetts.

21.2. Venue.

21.2.1. Venue for any court action or proceeding shall be Middlesex County in the Commonwealth of Massachusetts only. The **Contractor**, all Subcontractors, and Suppliers waive any and all jurisdictional and venue defenses.

21.3. Successors and Assigns.

21.3.1. The **Contractor** shall not assign, in whole or in part, its rights and obligations under the Contract Documents without prior written consent of the **City**. An assignment without the prior written consent of the **City** shall not relieve the **Contractor** of its obligations thereunder.

21.3.2. The **City** and the **Contractor** respectively bind themselves, their partners, successors, assigns, and legal representatives to the other party hereto and to partners, successors, assigns, and legal representatives of such other party in respect to covenants, agreements, and obligations contained in the Contract Documents.

21.4. Statutory Limitation Period.

21.4.1. It is expressly agreed that the obligations of the **Contractor** hereunder arise out of contractual duties, and that the failure of the **Contractor** to comply with the requirements of the Contract Documents shall constitute a breach of contract, not a tort, for the purpose of applicable statutes of limitations and repose. Any cause of action which the **City** may have on account of such failure shall be deemed to accrue only when the **City** has obtained actual knowledge of such failure, not before.

21.5. Rights and Remedies.

21.5.1. Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

21.5.2. No action or failure to act by the **City**, the **Architect**, or the **Contractor** shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

THIS IS THE END OF THE GENERAL TERMS AND CONDITIONS

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SECTION 007316 - INSURANCE REQUIREMENTS

1.01 GENERAL

- A. This section specifies the Owner's requirements for insurance and relates to the General Conditions of the Contract for Construction and Supplementary General Conditions of the Contract for Construction.
- B. Provisions of the General Conditions of the Contract for Construction and Supplementary General Conditions of the Contract for Construction, which are not modified by the following Insurance Requirements remain in full effect.

1.02 INSURANCE REQUIREMENTS

- A. Insurance Limits: The insurance required shall be written for not less than the limits of liability required by law or the following limits, whichever is greater:

State and Federal Workmen's Compensation:

Benefits required by union contract:

statutory requirements
as required

GENERAL LIABILITY*

Bodily Injury and Property Damage Annual Aggregate Limit:

\$2,000,000

*General Liability shall include coverage for the following:

Comprehensive Form
Premises/Operations Liability
Explosion, Collapse and Underground [XCU].
Products/Completed Operations
Contractual Liability
Independent Contractors
Broad Form Property Damage
Personal Injury Including Libel and Slander Coverage with Employment
Exclusions Deleted
Broad Form CGL Endorsement

PRODUCTS AND COMPLETED OPERATIONS

Aggregate

\$2,000,000

Products and Completed Operations shall be maintained for a minimum of three years after the completion of the project.

The City of Lowell shall be named as an "Additional Insured"

ENVIRONMENTAL COVERAGE (contamination, etc.)

Each Occurrence

\$1,000,000

Aggregate

\$3,000,000

The City of Lowell shall be named as an "Additional Insured"

AUTOMOBILE LIABILITY (applicable for any contractor who has an operating exposure)**

Bodily Injury Per Accident

\$1,000,000

Property Damage Per Accident

\$1,000,000

** Provide coverage for All Owned, Non-owned, and Hired vehicles.

The City of Lowell shall be named as an "Additional Insured"

UMBRELLA EXCESS LIABILITY

Coverage over primary insurance

\$5,000,000

- B. BUILDER'S RISK INSURANCE: The Contractor shall provide "builder's risk" insurance as described in the General Conditions of the Contract for Construction and with limits equal to the full insurable completed *value* of the building under construction. The "Builder's Risk" insurance shall include "all risk" insurance for physical loss and damage including theft, vandalism, and malicious mischief. The "Builder's Risk" insurance shall be amended to delete all endorsements and provisions relating to cancellation of the policy due to partial occupancy by the Owner.
- C. PROPERTY COVERAGE: The Contractor shall provide property coverage for materials and supplies being transported by the Contractor within 1,000 feet of the premises.
- D. Exclusions: The Owner's property insurance shall not cover tools, equipment, shoring, staging, forms, temporary buildings, or other property or equipment owned or rented by the Contractor, its Subcontractors, nor any worker.
- E. Named Insured: Each insurance policy and certificate of insurance provided by the Contractor shall name the Owner and Engineer as an additional insured.
- F. Notice of Policy Cancellation and Amendment: Each insurance policy and certificate of insurance provided by the Contractor shall contain a provision that the Owner shall be notified of cancellation or restrictive amendment at least thirty [30] days prior to the effective date of such cancellation or amendment.
- G. Insurance Certificates: The Contractor and all subcontractors who are required to provide insurance under the Contract shall provide accurate and bona fide "Certificates of Insurance" issued by a responsible agent of the insurance company.
1. Certificate Content: Such "Certificates of Insurance" shall clearly indicate the insurance coverage provided including all riders and limits specified. Each "Certificate of Insurance" shall be accompanied by a sworn and duly notarized statement from the responsible agent of the insurance company issuing the Certificate clearly stating that all insurance specified and required by the Contract Documents is provided and in force, and also a clear statement of all exceptions and deviations, if any, from the Contract Document insurance requirements.
 2. Responsibility: The insurance agent issuing and authorizing the "Certificate of Insurance" shall be responsible and liable for the accuracy and validity of the "Certificate of Insurance". Each insured party shall certify by sworn and duly notarized statement that the "Certificates of Insurance" issued for them are bona fide.
 3. Disclaimers Prohibited: "Certificates of Insurance" shall not contain any disclaimers such as: "This Certificate is issued as a matter of information only and confers no rights upon the certificate holder. This Certificate does not amend, extend, or alter the coverage afforded by the policies listed below." Disclaimers are not acceptable.
 4. Certificates of Insurance Can Be Relied Upon: Parties receiving "Certificates of Insurance" shall be entitled to rely upon the "Certificates of Insurance" and shall have the right to claim the benefits and protection provided by the insurance as it applies to them.
 5. Alternate to "Certificates of Insurance": Instead of providing the "Certificates of Insurance" and the sworn statements required above, the insured may provide bona fide and accurate copies of all insurance policies and riders accompanied by a sworn and duly notarized statement from the insured that the policies, riders, and documents submitted are bona fide and valid, and that parties receiving the insurance documents may rely on the documents as satisfaction of the Contract insurance requirements.

END OF SECTION



CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF LABOR AND WORKFORCE DEVELOPMENT
DEPARTMENT OF LABOR STANDARDS

Prevailing Wage Rates

As determined by the Director under the provisions of the
Massachusetts General Laws, Chapter 149, Sections 26 to 27H

RONALD L. WALKER, II
Secretary

WILLIAM D MCKINNEY
Director

Awarding Authority: City of Lowell
Contract Number: IFB 16-22 **City/Town:** LOWELL
Description of Work: Leo A Roy & Lower Locks Parking Garage Restoration
Job Location: Lowell

Information about Prevailing Wage Schedules for Awarding Authorities and Contractors

- This wage schedule applies only to the specific project referenced at the top of this page and uniquely identified by the "Wage Request Number" on all pages of this schedule.
- An Awarding Authority must request an updated wage schedule from the Department of Labor Standards ("DLS") if it has not opened bids or selected a contractor within 90 days of the date of issuance of the wage schedule. For CM AT RISK projects (bid pursuant to G.L. c.149A), the earlier of: (a) the execution date of the GMP Amendment, or (b) the bid for the first construction scope of work must be within 90-days of the wage schedule issuance date.
- The wage schedule shall be incorporated in any advertisement or call for bids for the project as required by M.G.L. c. 149, § 27. The wage schedule shall be made a part of the contract awarded for the project. The wage schedule must be posted in a conspicuous place at the work site for the life of the project in accordance with M.G.L. c. 149 § 27. The wages listed on the wage schedule must be paid to employees performing construction work on the project whether they are employed by the prime contractor, a filed sub-bidder, or any sub-contractor.
- All apprentices working on the project are required to be registered with the Massachusetts Division of Apprentice Standards (DAS). Apprentice must keep his/her apprentice identification card on his/her person during all work hours on the project. An apprentice registered with DAS may be paid the lower apprentice wage rate at the applicable step as provided on the prevailing wage schedule. **If an apprentice rate is not listed on the prevailing wage schedule for the trade in which an apprentice is registered with the DAS, the apprentice must be paid the journeyworker's rate for the trade.**
- The wage rates will remain in effect for the duration of the project, except in the case of multi-year public construction projects. For construction projects lasting longer than one year, awarding authorities must request an updated wage schedule. Awarding authorities are required to request these updates no later than two weeks before the anniversary of the date the contract was executed by the awarding authority and the general contractor. For multi-year CM AT RISK projects, awarding authority must request an annual update no later than two weeks before the anniversary date, determined as the earlier of: (a) the execution date of the GMP Amendment, or (b) the execution date of the first amendment to permit procurement of construction services. Contractors are required to obtain the wage schedules from awarding authorities, and to pay no less than these rates to covered workers. The annual update requirement is not applicable to 27F "rental of equipment" contracts.
- Every contractor or subcontractor which performs construction work on the project is required to submit weekly payroll reports and a Statement of Compliance directly to the awarding authority by mail or email and keep them on file for three years. Each weekly payroll report must contain: the employee's name, address, occupational classification, hours worked, and wages paid. Do not submit weekly payroll reports to DLS. A sample of a payroll reporting form may be obtained at <http://www.mass.gov/dols/pw>.
- Contractors with questions about the wage rates or classifications included on the wage schedule have an affirmative obligation to inquire with DLS at (617) 626-6953.
- Employees not receiving the prevailing wage rate set forth on the wage schedule may report the violation to the Fair Labor Division of the office of the Attorney General at (617) 727-3465.
- Failure of a contractor or subcontractor to pay the prevailing wage rates listed on the wage schedule to all employees who perform construction work on the project is a violation of the law and subjects the contractor or subcontractor to civil and criminal penalties.

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
Construction						
(2 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2015	\$31.65	\$9.91	\$9.33	\$0.00	\$50.89
	08/01/2015	\$31.65	\$10.41	\$9.33	\$0.00	\$51.39
	12/01/2015	\$31.65	\$10.41	\$10.08	\$0.00	\$52.14
	06/01/2016	\$32.15	\$10.41	\$10.08	\$0.00	\$52.64
	08/01/2016	\$32.15	\$10.91	\$10.08	\$0.00	\$53.14
	12/01/2016	\$32.15	\$10.91	\$10.89	\$0.00	\$53.95
(3 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2015	\$31.72	\$9.91	\$9.33	\$0.00	\$50.96
	08/01/2015	\$31.72	\$10.41	\$9.33	\$0.00	\$51.46
	12/01/2015	\$31.72	\$10.41	\$10.08	\$0.00	\$52.21
	06/01/2016	\$32.22	\$10.41	\$10.08	\$0.00	\$52.71
	08/01/2016	\$32.22	\$10.91	\$10.08	\$0.00	\$53.21
	12/01/2016	\$32.22	\$10.91	\$10.89	\$0.00	\$54.02
(4 & 5 AXLE) DRIVER - EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2015	\$31.84	\$9.91	\$9.33	\$0.00	\$51.08
	08/01/2015	\$31.84	\$10.41	\$9.33	\$0.00	\$51.58
	12/01/2015	\$31.84	\$10.41	\$10.08	\$0.00	\$52.33
	06/01/2016	\$32.34	\$10.41	\$10.08	\$0.00	\$52.83
	08/01/2016	\$32.34	\$10.91	\$10.08	\$0.00	\$53.33
	12/01/2016	\$32.34	\$10.91	\$10.89	\$0.00	\$54.14
ADS/SUBMERSIBLE PILOT <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2014	\$87.36	\$9.80	\$18.17	\$0.00	\$115.33
	08/01/2015	\$90.51	\$9.80	\$18.17	\$0.00	\$118.48
AIR TRACK OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	12/01/2015	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	06/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50
	12/01/2016	\$33.65	\$7.30	\$12.30	\$0.00	\$53.25
For apprentice rates see "Apprentice- LABORER"						
ASBESTOS REMOVER - PIPE / MECH. EQUIPT. <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	06/01/2015	\$33.43	\$10.40	\$5.95	\$0.00	\$49.78
	12/01/2015	\$34.38	\$10.40	\$5.95	\$0.00	\$50.73
ASPHALT RAKER <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
ASPHALT/CONCRETE/CRUSHER PLANT-ON SITE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$42.83	\$10.00	\$14.55	\$0.00	\$67.38
	12/01/2015	\$44.08	\$10.00	\$14.55	\$0.00	\$68.63
	06/01/2016	\$44.83	\$10.00	\$14.55	\$0.00	\$69.38
	12/01/2016	\$46.08	\$10.00	\$14.55	\$0.00	\$70.63
	06/01/2017	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
	12/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BACKHOE/FRONT-END LOADER <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$42.83	\$10.00	\$14.55	\$0.00	\$67.38
	12/01/2015	\$44.08	\$10.00	\$14.55	\$0.00	\$68.63
	06/01/2016	\$44.83	\$10.00	\$14.55	\$0.00	\$69.38
	12/01/2016	\$46.08	\$10.00	\$14.55	\$0.00	\$70.63
	06/01/2017	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
	12/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
BARCO-TYPE JUMPING TAMPER	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
LABORERS - ZONE 2	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
BLOCK PAVER, RAMMER / CURB SETTER	06/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
LABORERS - ZONE 2	12/01/2015	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	06/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50
	12/01/2016	\$33.65	\$7.30	\$12.30	\$0.00	\$53.25
For apprentice rates see "Apprentice- LABORER"						
BOILER MAKER	01/01/2010	\$37.70	\$6.97	\$11.18	\$0.00	\$55.85
BOILERMAKERS LOCAL 29						

Apprentice - BOILERMAKER - Local 29

Effective Date - 01/01/2010

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	65	\$24.51	\$6.97	\$11.18	\$0.00	\$42.66
2	65	\$24.51	\$6.97	\$11.18	\$0.00	\$42.66
3	70	\$26.39	\$6.97	\$11.18	\$0.00	\$44.54
4	75	\$28.28	\$6.97	\$11.18	\$0.00	\$46.43
5	80	\$30.16	\$6.97	\$11.18	\$0.00	\$48.31
6	85	\$32.05	\$6.97	\$11.18	\$0.00	\$50.20
7	90	\$33.93	\$6.97	\$11.18	\$0.00	\$52.08
8	95	\$35.82	\$6.97	\$11.18	\$0.00	\$53.97

Notes:

Apprentice to Journeyworker Ratio:1:5

BRICK/STONE/ARTIFICIAL MASONRY (INCL. MASONRY WATERPROOFING)	03/01/2015	\$46.86	\$10.18	\$17.90	\$0.00	\$74.94
BRICKLAYERS LOCAL 3 (LOWELL)	09/01/2015	\$47.76	\$10.18	\$17.97	\$0.00	\$75.91
	03/01/2016	\$48.33	\$10.18	\$17.97	\$0.00	\$76.48
	09/01/2016	\$49.23	\$10.18	\$18.05	\$0.00	\$77.46
	03/01/2017	\$49.80	\$10.18	\$18.05	\$0.00	\$78.03

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - BRICK/PLASTER/CEMENT MASON - Local 3 Lowell

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.43	\$10.18	\$17.90	\$0.00	\$51.51
2	60	\$28.12	\$10.18	\$17.90	\$0.00	\$56.20
3	70	\$32.80	\$10.18	\$17.90	\$0.00	\$60.88
4	80	\$37.49	\$10.18	\$17.90	\$0.00	\$65.57
5	90	\$42.17	\$10.18	\$17.90	\$0.00	\$70.25

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.88	\$10.18	\$17.97	\$0.00	\$52.03
2	60	\$28.66	\$10.18	\$17.97	\$0.00	\$56.81
3	70	\$33.43	\$10.18	\$17.97	\$0.00	\$61.58
4	80	\$38.21	\$10.18	\$17.97	\$0.00	\$66.36
5	90	\$42.98	\$10.18	\$17.97	\$0.00	\$71.13

Notes:

Apprentice to Journeyworker Ratio:1:5

BULLDOZER/GRADER/SCRAPER	06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
	06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
	12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
	06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
	12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
CAISSON & UNDERPINNING BOTTOM MAN	06/01/2015	\$36.20	\$7.30	\$13.40	\$0.00	\$56.90
LABORERS - FOUNDATION AND MARINE	12/01/2015	\$36.95	\$7.30	\$13.40	\$0.00	\$57.65
	06/01/2016	\$37.70	\$7.30	\$13.40	\$0.00	\$58.40
	12/01/2016	\$38.70	\$7.30	\$13.40	\$0.00	\$59.40
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING LABORER	06/01/2015	\$35.05	\$7.30	\$13.40	\$0.00	\$55.75
LABORERS - FOUNDATION AND MARINE	12/01/2015	\$35.80	\$7.30	\$13.40	\$0.00	\$56.50
	06/01/2016	\$36.55	\$7.30	\$13.40	\$0.00	\$57.25
	12/01/2016	\$37.55	\$7.30	\$13.40	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
CAISSON & UNDERPINNING TOP MAN	06/01/2015	\$35.05	\$7.30	\$13.40	\$0.00	\$55.75
LABORERS - FOUNDATION AND MARINE	12/01/2015	\$35.80	\$7.30	\$13.40	\$0.00	\$56.50
	06/01/2016	\$36.55	\$7.30	\$13.40	\$0.00	\$57.25
	12/01/2016	\$37.55	\$7.30	\$13.40	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
CARBIDE CORE DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
CARPENTER <i>CARPENTERS -ZONE 2 (Eastern Massachusetts)</i>	03/01/2015	\$35.75	\$9.80	\$16.48	\$0.00	\$62.03

Apprentice - CARPENTER - Zone 2 Eastern MA

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$17.88	\$9.80	\$1.63	\$0.00	\$29.31
2	60	\$21.45	\$9.80	\$1.63	\$0.00	\$32.88
3	70	\$25.03	\$9.80	\$11.59	\$0.00	\$46.42
4	75	\$26.81	\$9.80	\$11.59	\$0.00	\$48.20
5	80	\$28.60	\$9.80	\$13.22	\$0.00	\$51.62
6	80	\$28.60	\$9.80	\$13.22	\$0.00	\$51.62
7	90	\$32.18	\$9.80	\$14.85	\$0.00	\$56.83
8	90	\$32.18	\$9.80	\$14.85	\$0.00	\$56.83

Notes:

Apprentice to Journeyworker Ratio:1:5

CEMENT MASONRY/PLASTERING <i>BRICKLAYERS LOCAL 3 (LOWELL)</i>	07/01/2015	\$42.87	\$10.90	\$18.71	\$1.30	\$73.78
	01/01/2016	\$43.51	\$10.90	\$18.71	\$1.30	\$74.42

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - CEMENT MASONRY/PLASTERING - Lowell
Effective Date - 07/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.44	\$10.90	\$12.21	\$0.00	\$44.55
2	60	\$25.72	\$10.90	\$13.71	\$1.30	\$51.63
3	65	\$27.87	\$10.90	\$14.71	\$1.30	\$54.78
4	70	\$30.01	\$10.90	\$15.71	\$1.30	\$57.92
5	75	\$32.15	\$10.90	\$16.71	\$1.30	\$61.06
6	80	\$34.30	\$10.90	\$17.71	\$1.30	\$64.21
7	90	\$38.58	\$10.90	\$18.71	\$1.30	\$69.49

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.76	\$10.90	\$12.21	\$0.00	\$44.87
2	60	\$26.11	\$10.90	\$13.71	\$1.30	\$52.02
3	65	\$28.28	\$10.90	\$14.71	\$1.30	\$55.19
4	70	\$30.46	\$10.90	\$15.71	\$1.30	\$58.37
5	75	\$32.63	\$10.90	\$16.71	\$1.30	\$61.54
6	80	\$34.81	\$10.90	\$17.71	\$1.30	\$64.72
7	90	\$39.16	\$10.90	\$18.71	\$1.30	\$70.07

Notes:

Steps 3,4 are 500 hrs. All other steps are 1,000 hrs.

Apprentice to Journeyworker Ratio:1:3

CHAIN SAW OPERATOR	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
LABORERS - ZONE 2	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
CLAM SHELLS/SLURRY BUCKETS/HEADING MACHINES	06/01/2015	\$43.83	\$10.00	\$14.55	\$0.00	\$68.38
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$45.08	\$10.00	\$14.55	\$0.00	\$69.63
	06/01/2016	\$45.83	\$10.00	\$14.55	\$0.00	\$70.38
	12/01/2016	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
	06/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63
	12/01/2017	\$49.08	\$10.00	\$14.55	\$0.00	\$73.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
COMPRESSOR OPERATOR	06/01/2015	\$29.61	\$10.00	\$14.55	\$0.00	\$54.16
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$30.48	\$10.00	\$14.55	\$0.00	\$55.03
	06/01/2016	\$31.00	\$10.00	\$14.55	\$0.00	\$55.55
	12/01/2016	\$31.87	\$10.00	\$14.55	\$0.00	\$56.42
	06/01/2017	\$32.56	\$10.00	\$14.55	\$0.00	\$57.11
	12/01/2017	\$33.25	\$10.00	\$14.55	\$0.00	\$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
DELEADER (BRIDGE)	07/01/2015	\$48.56	\$7.85	\$16.10	\$0.00	\$72.51
<i>PAINTERS LOCAL 35 - ZONE 2</i>	01/01/2016	\$49.51	\$7.85	\$16.10	\$0.00	\$73.46
	07/01/2016	\$50.46	\$7.85	\$16.10	\$0.00	\$74.41
	01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS

Effective Date - 07/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.28	\$7.85	\$0.00	\$0.00	\$32.13
2	55	\$26.71	\$7.85	\$3.66	\$0.00	\$38.22
3	60	\$29.14	\$7.85	\$3.99	\$0.00	\$40.98
4	65	\$31.56	\$7.85	\$4.32	\$0.00	\$43.73
5	70	\$33.99	\$7.85	\$14.11	\$0.00	\$55.95
6	75	\$36.42	\$7.85	\$14.44	\$0.00	\$58.71
7	80	\$38.85	\$7.85	\$14.77	\$0.00	\$61.47
8	90	\$43.70	\$7.85	\$15.44	\$0.00	\$66.99

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.76	\$7.85	\$0.00	\$0.00	\$32.61
2	55	\$27.23	\$7.85	\$3.66	\$0.00	\$38.74
3	60	\$29.71	\$7.85	\$3.99	\$0.00	\$41.55
4	65	\$32.18	\$7.85	\$4.32	\$0.00	\$44.35
5	70	\$34.66	\$7.85	\$14.11	\$0.00	\$56.62
6	75	\$37.13	\$7.85	\$14.44	\$0.00	\$59.42
7	80	\$39.61	\$7.85	\$14.77	\$0.00	\$62.23
8	90	\$44.56	\$7.85	\$15.44	\$0.00	\$67.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

DEMO: ADZEMAN	06/01/2015	\$35.25	\$7.30	\$13.20	\$0.00	\$55.75
<i>LABORERS - ZONE 2</i>	12/01/2015	\$36.00	\$7.30	\$13.20	\$0.00	\$56.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: BACKHOE/LOADER/HAMMER OPERATOR	06/01/2015	\$36.25	\$7.30	\$13.20	\$0.00	\$56.75
<i>LABORERS - ZONE 2</i>	12/01/2015	\$37.00	\$7.30	\$13.20	\$0.00	\$57.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: BURNERS	06/01/2015	\$36.00	\$7.30	\$13.20	\$0.00	\$56.50
<i>LABORERS - ZONE 2</i>	12/01/2015	\$36.75	\$7.30	\$13.20	\$0.00	\$57.25
For apprentice rates see "Apprentice- LABORER"						
DEMO: CONCRETE CUTTER/SAWYER	06/01/2015	\$36.25	\$7.30	\$13.20	\$0.00	\$56.75
<i>LABORERS - ZONE 2</i>	12/01/2015	\$37.00	\$7.30	\$13.20	\$0.00	\$57.50
For apprentice rates see "Apprentice- LABORER"						
DEMO: JACKHAMMER OPERATOR	06/01/2015	\$36.00	\$7.30	\$13.20	\$0.00	\$56.50
<i>LABORERS - ZONE 2</i>	12/01/2015	\$36.75	\$7.30	\$13.20	\$0.00	\$57.25

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
For apprentice rates see "Apprentice- LABORER"						
DEMO: WRECKING LABORER	06/01/2015	\$35.25	\$7.30	\$13.20	\$0.00	\$55.75
LABORERS - ZONE 2	12/01/2015	\$36.00	\$7.30	\$13.20	\$0.00	\$56.50
For apprentice rates see "Apprentice- LABORER"						
DIRECTIONAL DRILL MACHINE OPERATOR	06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
	06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
	12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
	06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
	12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
DIVER	08/01/2014	\$58.24	\$9.80	\$18.17	\$0.00	\$86.21
PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$60.34	\$9.80	\$18.17	\$0.00	\$88.31
DIVER TENDER	08/01/2014	\$41.60	\$9.80	\$18.17	\$0.00	\$69.57
PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$43.10	\$9.80	\$18.17	\$0.00	\$71.07
DIVER TENDER (EFFLUENT)	08/01/2014	\$62.40	\$9.80	\$18.17	\$0.00	\$90.37
PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$64.65	\$9.80	\$18.17	\$0.00	\$92.62
DIVER/SLURRY (EFFLUENT)	08/01/2014	\$87.36	\$9.80	\$18.17	\$0.00	\$115.33
PILE DRIVER LOCAL 56 (ZONE 1)	08/01/2015	\$90.51	\$9.80	\$18.17	\$0.00	\$118.48
DRAWBRIDGE OPERATOR (Construction)	03/01/2015	\$45.17	\$13.00	\$15.40	\$0.00	\$73.57
ELECTRICIANS LOCAL 103	09/01/2015	\$46.13	\$13.00	\$15.43	\$0.00	\$74.56
	03/01/2016	\$47.08	\$13.00	\$15.46	\$0.00	\$75.54
For apprentice rates see "Apprentice- ELECTRICIAN"						
ELECTRICIAN	03/01/2015	\$45.17	\$13.00	\$15.40	\$0.00	\$73.57
ELECTRICIANS LOCAL 103	09/01/2015	\$46.13	\$13.00	\$15.43	\$0.00	\$74.56
	03/01/2016	\$47.08	\$13.00	\$15.46	\$0.00	\$75.54

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - ELECTRICIAN - Local 103
Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.07	\$13.00	\$0.54	\$0.00	\$31.61
2	40	\$18.07	\$13.00	\$0.54	\$0.00	\$31.61
3	45	\$20.33	\$13.00	\$11.64	\$0.00	\$44.97
4	45	\$20.33	\$13.00	\$11.64	\$0.00	\$44.97
5	50	\$22.59	\$13.00	\$11.98	\$0.00	\$47.57
6	55	\$24.84	\$13.00	\$12.33	\$0.00	\$50.17
7	60	\$27.10	\$13.00	\$12.66	\$0.00	\$52.76
8	65	\$29.36	\$13.00	\$13.01	\$0.00	\$55.37
9	70	\$31.62	\$13.00	\$13.35	\$0.00	\$57.97
10	75	\$33.88	\$13.00	\$13.70	\$0.00	\$60.58

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$18.45	\$13.00	\$0.55	\$0.00	\$32.00
2	40	\$18.45	\$13.00	\$0.55	\$0.00	\$32.00
3	45	\$20.76	\$13.00	\$11.65	\$0.00	\$45.41
4	45	\$20.76	\$13.00	\$11.65	\$0.00	\$45.41
5	50	\$23.07	\$13.00	\$11.99	\$0.00	\$48.06
6	55	\$25.37	\$13.00	\$12.34	\$0.00	\$50.71
7	60	\$27.68	\$13.00	\$12.68	\$0.00	\$53.36
8	65	\$29.98	\$13.00	\$13.03	\$0.00	\$56.01
9	70	\$32.29	\$13.00	\$13.37	\$0.00	\$58.66
10	75	\$34.60	\$13.00	\$13.72	\$0.00	\$61.32

Notes: :

App Prior 1/1/03; 30/35/40/45/50/55/65/70/75/80

Apprentice to Journeyworker Ratio:2:3***

ELEVATOR CONSTRUCTOR	01/01/2015	\$53.30	\$13.58	\$14.21	\$0.00	\$81.09
ELEVATOR CONSTRUCTORS LOCAL 4	01/01/2016	\$54.53	\$14.43	\$14.96	\$0.00	\$83.92
	01/01/2017	\$55.86	\$15.28	\$15.71	\$0.00	\$86.85

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - ELEVATOR CONSTRUCTOR - Local 4

Effective Date - 01/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$26.65	\$13.58	\$0.00	\$0.00	\$40.23
2	55	\$29.32	\$13.58	\$14.21	\$0.00	\$57.11
3	65	\$34.65	\$13.58	\$14.21	\$0.00	\$62.44
4	70	\$37.31	\$13.58	\$14.21	\$0.00	\$65.10
5	80	\$42.64	\$13.58	\$14.21	\$0.00	\$70.43

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$27.27	\$14.43	\$0.00	\$0.00	\$41.70
2	55	\$29.99	\$14.43	\$14.96	\$0.00	\$59.38
3	65	\$35.44	\$14.43	\$14.96	\$0.00	\$64.83
4	70	\$38.17	\$14.43	\$14.96	\$0.00	\$67.56
5	80	\$43.62	\$14.43	\$14.96	\$0.00	\$73.01

Notes:

Steps 1-2 are 6 mos.; Steps 3-5 are 1 year

Apprentice to Journeyworker Ratio:1:1

ELEVATOR CONSTRUCTOR HELPER <i>ELEVATOR CONSTRUCTORS LOCAL 4</i>	01/01/2015	\$37.31	\$13.58	\$14.21	\$0.00	\$65.10
	01/01/2016	\$38.17	\$14.43	\$14.96	\$0.00	\$67.56
	01/01/2017	\$39.10	\$15.28	\$15.71	\$0.00	\$70.09
For apprentice rates see "Apprentice - ELEVATOR CONSTRUCTOR"						
FENCE & GUARD RAIL ERECTOR <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
FIELD ENG.INST.PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2015	\$40.22	\$10.00	\$14.30	\$0.00	\$64.52
	11/01/2015	\$40.80	\$10.00	\$14.30	\$0.00	\$65.10
	05/01/2016	\$41.69	\$10.00	\$14.30	\$0.00	\$65.99
	11/01/2016	\$42.28	\$10.00	\$14.30	\$0.00	\$66.58
	05/01/2017	\$43.16	\$10.00	\$14.30	\$0.00	\$67.46
	11/01/2017	\$43.89	\$10.00	\$14.30	\$0.00	\$68.19
	05/01/2018	\$44.60	\$10.00	\$14.30	\$0.00	\$68.90
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIELD ENG.PARTY CHIEF-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2015	\$41.65	\$10.00	\$14.30	\$0.00	\$65.95
	11/01/2015	\$42.24	\$10.00	\$14.30	\$0.00	\$66.54
	05/01/2016	\$43.13	\$10.00	\$14.30	\$0.00	\$67.43
	11/01/2016	\$43.73	\$10.00	\$14.30	\$0.00	\$68.03
	05/01/2017	\$44.62	\$10.00	\$14.30	\$0.00	\$68.92
	11/01/2017	\$45.35	\$10.00	\$14.30	\$0.00	\$69.65
	05/01/2018	\$46.07	\$10.00	\$14.30	\$0.00	\$70.37
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
FIELD ENG.ROD PERSON-BLDG,SITE,HVY/HWY <i>OPERATING ENGINEERS LOCAL 4</i>	05/01/2015	\$21.68	\$10.00	\$14.30	\$0.00	\$45.98
	11/01/2015	\$22.02	\$10.00	\$14.30	\$0.00	\$46.32
	05/01/2016	\$22.54	\$10.00	\$14.30	\$0.00	\$46.84
	11/01/2016	\$22.89	\$10.00	\$14.30	\$0.00	\$47.19
	05/01/2017	\$23.42	\$10.00	\$14.30	\$0.00	\$47.72
	11/01/2017	\$23.84	\$10.00	\$14.30	\$0.00	\$48.14
	05/01/2018	\$24.27	\$10.00	\$14.30	\$0.00	\$48.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FIRE ALARM INSTALLER <i>ELECTRICIANS LOCAL 103</i>	03/01/2015	\$45.17	\$13.00	\$15.40	\$0.00	\$73.57
	09/01/2015	\$46.13	\$13.00	\$15.43	\$0.00	\$74.56
	03/01/2016	\$47.08	\$13.00	\$15.46	\$0.00	\$75.54
For apprentice rates see "Apprentice- ELECTRICIAN"						
FIRE ALARM REPAIR / MAINTENANCE / COMMISSIONING <i>ELECTRICIANS</i> <i>LOCAL 103</i>	03/01/2015	\$33.88	\$13.00	\$13.70	\$0.00	\$60.58
	09/01/2015	\$34.60	\$13.00	\$13.72	\$0.00	\$61.32
	03/01/2016	\$35.31	\$13.00	\$13.74	\$0.00	\$62.05
For apprentice rates see "Apprentice- TELECOMMUNICATIONS TECHNICIAN"						
FIREMAN (ASST. ENGINEER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$35.64	\$10.00	\$14.55	\$0.00	\$60.19
	12/01/2015	\$36.69	\$10.00	\$14.55	\$0.00	\$61.24
	06/01/2016	\$37.31	\$10.00	\$14.55	\$0.00	\$61.86
	12/01/2016	\$38.35	\$10.00	\$14.55	\$0.00	\$62.90
	06/01/2017	\$39.19	\$10.00	\$14.55	\$0.00	\$63.74
	12/01/2017	\$40.02	\$10.00	\$14.55	\$0.00	\$64.57
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
FLAGGER & SIGNALER <i>LABORERS - ZONE 2</i>	06/01/2015	\$20.50	\$7.30	\$12.30	\$0.00	\$40.10
	12/01/2015	\$20.50	\$7.30	\$12.30	\$0.00	\$40.10
	06/01/2016	\$20.50	\$7.30	\$12.30	\$0.00	\$40.10
	12/01/2016	\$20.50	\$7.30	\$12.30	\$0.00	\$40.10
For apprentice rates see "Apprentice- LABORER"						
FLOORCOVERER <i>FLOORCOVERERS LOCAL 2168 ZONE I</i>	09/01/2014	\$40.40	\$9.80	\$17.21	\$0.00	\$67.41

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - FLOORCOVERER - Local 2168 Zone I
Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.20	\$9.80	\$1.79	\$0.00	\$31.79
2	55	\$22.22	\$9.80	\$1.79	\$0.00	\$33.81
3	60	\$24.24	\$9.80	\$11.84	\$0.00	\$45.88
4	65	\$26.26	\$9.80	\$11.84	\$0.00	\$47.90
5	70	\$28.28	\$9.80	\$13.63	\$0.00	\$51.71
6	75	\$30.30	\$9.80	\$13.63	\$0.00	\$53.73
7	80	\$32.32	\$9.80	\$15.42	\$0.00	\$57.54
8	85	\$34.34	\$9.80	\$15.42	\$0.00	\$59.56

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

FORK LIFT/CHERRY PICKER	06/01/2015	\$42.83	\$10.00	\$14.55	\$0.00	\$67.38
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$44.08	\$10.00	\$14.55	\$0.00	\$68.63
	06/01/2016	\$44.83	\$10.00	\$14.55	\$0.00	\$69.38
	12/01/2016	\$46.08	\$10.00	\$14.55	\$0.00	\$70.63
	06/01/2017	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
	12/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GENERATOR/LIGHTING PLANT/HEATERS	06/01/2015	\$29.61	\$10.00	\$14.55	\$0.00	\$54.16
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$30.48	\$10.00	\$14.55	\$0.00	\$55.03
	06/01/2016	\$31.00	\$10.00	\$14.55	\$0.00	\$55.55
	12/01/2016	\$31.87	\$10.00	\$14.55	\$0.00	\$56.42
	06/01/2017	\$32.56	\$10.00	\$14.55	\$0.00	\$57.11
	12/01/2017	\$33.25	\$10.00	\$14.55	\$0.00	\$57.80

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

GLAZIER (GLASS PLANK/AIR BARRIER/INTERIOR SYSTEMS)	07/01/2015	\$38.06	\$7.85	\$16.10	\$0.00	\$62.01
GLAZIERS LOCAL 35 (ZONE 2)	01/01/2016	\$39.01	\$7.85	\$16.10	\$0.00	\$62.96
	07/01/2016	\$39.96	\$7.85	\$16.10	\$0.00	\$63.91
	01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - GLAZIER - Local 35 Zone 2
Effective Date - 07/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.03	\$7.85	\$0.00	\$0.00	\$26.88
2	55	\$20.93	\$7.85	\$3.66	\$0.00	\$32.44
3	60	\$22.84	\$7.85	\$3.99	\$0.00	\$34.68
4	65	\$24.74	\$7.85	\$4.32	\$0.00	\$36.91
5	70	\$26.64	\$7.85	\$14.11	\$0.00	\$48.60
6	75	\$28.55	\$7.85	\$14.44	\$0.00	\$50.84
7	80	\$30.45	\$7.85	\$14.77	\$0.00	\$53.07
8	90	\$34.25	\$7.85	\$15.44	\$0.00	\$57.54

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.51	\$7.85	\$0.00	\$0.00	\$27.36
2	55	\$21.46	\$7.85	\$3.66	\$0.00	\$32.97
3	60	\$23.41	\$7.85	\$3.99	\$0.00	\$35.25
4	65	\$25.36	\$7.85	\$4.32	\$0.00	\$37.53
5	70	\$27.31	\$7.85	\$14.11	\$0.00	\$49.27
6	75	\$29.26	\$7.85	\$14.44	\$0.00	\$51.55
7	80	\$31.21	\$7.85	\$14.77	\$0.00	\$53.83
8	90	\$35.11	\$7.85	\$15.44	\$0.00	\$58.40

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1
HOISTING ENGINEER/CRANES/GRADALLS
OPERATING ENGINEERS LOCAL 4

06/01/2015	\$42.83	\$10.00	\$14.55	\$0.00	\$67.38
12/01/2015	\$44.08	\$10.00	\$14.55	\$0.00	\$68.63
06/01/2016	\$44.83	\$10.00	\$14.55	\$0.00	\$69.38
12/01/2016	\$46.08	\$10.00	\$14.55	\$0.00	\$70.63
06/01/2017	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
12/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - OPERATING ENGINEERS - Local 4
Effective Date - 06/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$23.56	\$10.00	\$0.00	\$0.00	\$33.56
2	60	\$25.70	\$10.00	\$14.55	\$0.00	\$50.25
3	65	\$27.84	\$10.00	\$14.55	\$0.00	\$52.39
4	70	\$29.98	\$10.00	\$14.55	\$0.00	\$54.53
5	75	\$32.12	\$10.00	\$14.55	\$0.00	\$56.67
6	80	\$34.26	\$10.00	\$14.55	\$0.00	\$58.81
7	85	\$36.41	\$10.00	\$14.55	\$0.00	\$60.96
8	90	\$38.55	\$10.00	\$14.55	\$0.00	\$63.10

Effective Date - 12/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	55	\$24.24	\$10.00	\$0.00	\$0.00	\$34.24
2	60	\$26.45	\$10.00	\$14.55	\$0.00	\$51.00
3	65	\$28.65	\$10.00	\$14.55	\$0.00	\$53.20
4	70	\$30.86	\$10.00	\$14.55	\$0.00	\$55.41
5	75	\$33.06	\$10.00	\$14.55	\$0.00	\$57.61
6	80	\$35.26	\$10.00	\$14.55	\$0.00	\$59.81
7	85	\$37.47	\$10.00	\$14.55	\$0.00	\$62.02
8	90	\$39.67	\$10.00	\$14.55	\$0.00	\$64.22

Notes:
Apprentice to Journeyworker Ratio:1:6
HVAC (DUCTWORK)
SHEETMETAL WORKERS LOCAL 17 - A

02/01/2015	\$43.28	\$10.20	\$20.54	\$2.22	\$76.24
08/01/2015	\$43.31	\$10.20	\$21.48	\$2.25	\$77.24
02/01/2016	\$44.31	\$10.20	\$21.48	\$2.25	\$78.24
08/01/2016	\$45.46	\$10.20	\$21.48	\$2.25	\$79.39
02/01/2017	\$46.56	\$10.20	\$21.48	\$2.25	\$80.49
08/01/2017	\$47.66	\$10.20	\$21.48	\$2.25	\$81.59
02/01/2018	\$48.81	\$10.20	\$21.48	\$2.25	\$82.74

For apprentice rates see "Apprentice- SHEET METAL WORKER"

HVAC (ELECTRICAL CONTROLS)
ELECTRICIANS LOCAL 103

03/01/2015	\$45.17	\$13.00	\$15.40	\$0.00	\$73.57
09/01/2015	\$46.13	\$13.00	\$15.43	\$0.00	\$74.56
03/01/2016	\$47.08	\$13.00	\$15.46	\$0.00	\$75.54

For apprentice rates see "Apprentice- ELECTRICIAN"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
HVAC (TESTING AND BALANCING - AIR) <i>SHEETMETAL WORKERS LOCAL 17 - A</i>	02/01/2015	\$43.28	\$10.20	\$20.54	\$2.22	\$76.24
	08/01/2015	\$43.31	\$10.20	\$21.48	\$2.25	\$77.24
	02/01/2016	\$44.31	\$10.20	\$21.48	\$2.25	\$78.24
	08/01/2016	\$45.46	\$10.20	\$21.48	\$2.25	\$79.39
	02/01/2017	\$46.56	\$10.20	\$21.48	\$2.25	\$80.49
	08/01/2017	\$47.66	\$10.20	\$21.48	\$2.25	\$81.59
	02/01/2018	\$48.81	\$10.20	\$21.48	\$2.25	\$82.74
For apprentice rates see "Apprentice- SHEET METAL WORKER"						
HVAC (TESTING AND BALANCING -WATER) <i>PIPEFITTERS LOCAL 537</i>	03/01/2015	\$48.69	\$9.70	\$16.89	\$0.00	\$75.28
	09/01/2015	\$49.69	\$9.70	\$16.89	\$0.00	\$76.28
	03/01/2016	\$50.69	\$9.70	\$16.89	\$0.00	\$77.28
	09/01/2016	\$51.69	\$9.70	\$16.89	\$0.00	\$78.28
	03/01/2017	\$52.69	\$9.70	\$16.89	\$0.00	\$79.28
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HVAC MECHANIC <i>PIPEFITTERS LOCAL 537</i>	03/01/2015	\$48.69	\$9.70	\$16.89	\$0.00	\$75.28
	09/01/2015	\$49.69	\$9.70	\$16.89	\$0.00	\$76.28
	03/01/2016	\$50.69	\$9.70	\$16.89	\$0.00	\$77.28
	09/01/2016	\$51.69	\$9.70	\$16.89	\$0.00	\$78.28
	03/01/2017	\$52.69	\$9.70	\$16.89	\$0.00	\$79.28
For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"						
HYDRAULIC DRILLS <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	12/01/2015	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	06/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50
	12/01/2016	\$33.65	\$7.30	\$12.30	\$0.00	\$53.25
For apprentice rates see "Apprentice- LABORER"						
INSULATOR (PIPES & TANKS) <i>HEAT & FROST INSULATORS LOCAL 6 (BOSTON)</i>	09/01/2014	\$43.31	\$11.25	\$12.60	\$0.00	\$67.16

Apprentice - ASBESTOS INSULATOR (Pipes & Tanks) - Local 6 Boston

Effective Date - 09/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.66	\$11.25	\$9.35	\$0.00	\$42.26
2	60	\$25.99	\$11.25	\$10.00	\$0.00	\$47.24
3	70	\$30.32	\$11.25	\$10.65	\$0.00	\$52.22
4	80	\$34.65	\$11.25	\$11.30	\$0.00	\$57.20

Notes:

Steps are 1 year

Apprentice to Journeyworker Ratio:1:4

IRONWORKER/WELDER <i>IRONWORKERS LOCAL 7 (LAWRENCE AREA)</i>	03/16/2015	\$37.70	\$7.70	\$20.25	\$0.00	\$65.65
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Apprentice - IRONWORKER - Local 7 Lawrence**Effective Date -** 03/16/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$22.62	\$7.70	\$20.25	\$0.00	\$50.57
2	70	\$26.39	\$7.70	\$20.25	\$0.00	\$54.34
3	75	\$28.28	\$7.70	\$20.25	\$0.00	\$56.23
4	80	\$30.16	\$7.70	\$20.25	\$0.00	\$58.11
5	85	\$32.05	\$7.70	\$20.25	\$0.00	\$60.00
6	90	\$33.93	\$7.70	\$20.25	\$0.00	\$61.88

Notes:

Structural 1:6; Ornamental 1:4

Apprentice to Journeyworker Ratio:**JACKHAMMER & PAVING BREAKER OPERATOR**

LABORERS - ZONE 2

06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75

For apprentice rates see "Apprentice- LABORER"

LABORER

LABORERS - ZONE 2

06/01/2015	\$31.15	\$7.30	\$12.30	\$0.00	\$50.75
12/01/2015	\$31.65	\$7.30	\$12.30	\$0.00	\$51.25
06/01/2016	\$32.15	\$7.30	\$12.30	\$0.00	\$51.75
12/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50

Apprentice - LABORER - Zone 2**Effective Date -** 06/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$18.69	\$7.30	\$12.30	\$0.00	\$38.29
2	70	\$21.81	\$7.30	\$12.30	\$0.00	\$41.41
3	80	\$24.92	\$7.30	\$12.30	\$0.00	\$44.52
4	90	\$28.04	\$7.30	\$12.30	\$0.00	\$47.64

Effective Date - 12/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$18.99	\$7.30	\$12.30	\$0.00	\$38.59
2	70	\$22.16	\$7.30	\$12.30	\$0.00	\$41.76
3	80	\$25.32	\$7.30	\$12.30	\$0.00	\$44.92
4	90	\$28.49	\$7.30	\$12.30	\$0.00	\$48.09

Notes:**Apprentice to Journeyworker Ratio:1:5**

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
LABORER: CARPENTER TENDER <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.15	\$7.30	\$12.30	\$0.00	\$50.75
	12/01/2015	\$31.65	\$7.30	\$12.30	\$0.00	\$51.25
	06/01/2016	\$32.15	\$7.30	\$12.30	\$0.00	\$51.75
	12/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: CEMENT FINISHER TENDER <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.15	\$7.30	\$12.30	\$0.00	\$50.75
	12/01/2015	\$31.65	\$7.30	\$12.30	\$0.00	\$51.25
	06/01/2016	\$32.15	\$7.30	\$12.30	\$0.00	\$51.75
	12/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: HAZARDOUS WASTE/ASBESTOS REMOVER <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.35	\$7.30	\$12.25	\$0.00	\$50.90
	12/01/2015	\$31.85	\$7.30	\$12.25	\$0.00	\$51.40
For apprentice rates see "Apprentice- LABORER"						
LABORER: MASON TENDER <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
LABORER: MULTI-TRADE TENDER <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.15	\$7.30	\$12.30	\$0.00	\$50.75
	12/01/2015	\$31.65	\$7.30	\$12.30	\$0.00	\$51.25
	06/01/2016	\$32.15	\$7.30	\$12.30	\$0.00	\$51.75
	12/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50
For apprentice rates see "Apprentice- LABORER"						
LABORER: TREE REMOVER <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.15	\$7.30	\$12.30	\$0.00	\$50.75
	12/01/2015	\$31.65	\$7.30	\$12.30	\$0.00	\$51.25
	06/01/2016	\$32.15	\$7.30	\$12.30	\$0.00	\$51.75
	12/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50
This classification applies to all tree work associated with the removal of standing trees, and trimming and removal of branches and limbs when the work is not done for a utility company for the purpose of operation, maintenance or repair of utility company equipment. For apprentice rates see "Apprentice- LABORER"						
LASER BEAM OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
MARBLE & TILE FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2015	\$37.37	\$10.18	\$17.18	\$0.00	\$64.73
	08/01/2015	\$38.08	\$10.18	\$17.25	\$0.00	\$65.51
	02/01/2016	\$38.53	\$10.18	\$17.25	\$0.00	\$65.96
	08/01/2016	\$39.23	\$10.18	\$17.33	\$0.00	\$66.74
	02/01/2017	\$39.69	\$10.18	\$17.33	\$0.00	\$67.20

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - MARBLE & TILE FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.69	\$10.18	\$17.18	\$0.00	\$46.05
2	60	\$22.42	\$10.18	\$17.18	\$0.00	\$49.78
3	70	\$26.16	\$10.18	\$17.18	\$0.00	\$53.52
4	80	\$29.90	\$10.18	\$17.18	\$0.00	\$57.26
5	90	\$33.63	\$10.18	\$17.18	\$0.00	\$60.99

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.04	\$10.18	\$17.25	\$0.00	\$46.47
2	60	\$22.85	\$10.18	\$17.25	\$0.00	\$50.28
3	70	\$26.66	\$10.18	\$17.25	\$0.00	\$54.09
4	80	\$30.46	\$10.18	\$17.25	\$0.00	\$57.89
5	90	\$34.27	\$10.18	\$17.25	\$0.00	\$61.70

Notes:

Apprentice to Journeyworker Ratio:1:3

MARBLE MASONS,TILELAYERS & TERRAZZO MECH	02/01/2015	\$49.00	\$10.18	\$18.50	\$0.00	\$77.68
BRICKLAYERS LOCAL 3 - MARBLE & TILE	08/01/2015	\$49.90	\$10.18	\$18.57	\$0.00	\$78.65
	02/01/2016	\$50.47	\$10.18	\$18.57	\$0.00	\$79.22
	08/01/2016	\$51.37	\$10.18	\$18.65	\$0.00	\$80.20
	02/01/2017	\$51.94	\$10.18	\$18.65	\$0.00	\$80.77

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - MARBLE-TILE-TERRAZZO MECHANIC - Local 3 Marble & Tile

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.50	\$10.18	\$18.50	\$0.00	\$53.18
2	60	\$29.40	\$10.18	\$18.50	\$0.00	\$58.08
3	70	\$34.30	\$10.18	\$18.50	\$0.00	\$62.98
4	80	\$39.20	\$10.18	\$18.50	\$0.00	\$67.88
5	90	\$44.10	\$10.18	\$18.50	\$0.00	\$72.78

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.95	\$10.18	\$18.57	\$0.00	\$53.70
2	60	\$29.94	\$10.18	\$18.57	\$0.00	\$58.69
3	70	\$34.93	\$10.18	\$18.57	\$0.00	\$63.68
4	80	\$39.92	\$10.18	\$18.57	\$0.00	\$68.67
5	90	\$44.91	\$10.18	\$18.57	\$0.00	\$73.66

Notes:

Apprentice to Journeyworker Ratio:1:5

MECH. SWEEPER OPERATOR (ON CONST. SITES)	06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
	06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
	12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
	06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
	12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MECHANICS MAINTENANCE	06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
	06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
	12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
	06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
	12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
MILLWRIGHT (Zone 2)	04/01/2015	\$34.69	\$9.80	\$16.21	\$0.00	\$60.70
MILLWRIGHTS LOCAL 1121 - Zone 2						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
Apprentice - MILLWRIGHT - Local 1121 Zone 2							
Effective Date - 04/01/2015							
Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate	
1	55	\$19.08	\$9.80	\$4.48	\$0.00	\$33.36	
2	65	\$22.55	\$9.80	\$13.36	\$0.00	\$45.71	
3	75	\$26.02	\$9.80	\$14.18	\$0.00	\$50.00	
4	85	\$29.49	\$9.80	\$14.99	\$0.00	\$54.28	
Notes:							
Steps are 2,000 hours							
Apprentice to Journeyworker Ratio:1:5							
MORTAR MIXER							
LABORERS - ZONE 2		06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
		12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
		06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
		12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"							
OILER (OTHER THAN TRUCK CRANES,GRADALLS)							
OPERATING ENGINEERS LOCAL 4		06/01/2015	\$21.97	\$10.00	\$14.55	\$0.00	\$46.52
		12/01/2015	\$22.62	\$10.00	\$14.55	\$0.00	\$47.17
		06/01/2016	\$23.01	\$10.00	\$14.55	\$0.00	\$47.56
		12/01/2016	\$23.66	\$10.00	\$14.55	\$0.00	\$48.21
		06/01/2017	\$24.17	\$10.00	\$14.55	\$0.00	\$48.72
		12/01/2017	\$24.69	\$10.00	\$14.55	\$0.00	\$49.24
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OILER (TRUCK CRANES, GRADALLS)							
OPERATING ENGINEERS LOCAL 4		06/01/2015	\$25.68	\$10.00	\$14.55	\$0.00	\$50.23
		12/01/2015	\$26.43	\$10.00	\$14.55	\$0.00	\$50.98
		06/01/2016	\$26.89	\$10.00	\$14.55	\$0.00	\$51.44
		12/01/2016	\$27.64	\$10.00	\$14.55	\$0.00	\$52.19
		06/01/2017	\$28.24	\$10.00	\$14.55	\$0.00	\$52.79
		12/01/2017	\$28.85	\$10.00	\$14.55	\$0.00	\$53.40
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
OTHER POWER DRIVEN EQUIPMENT - CLASS II							
OPERATING ENGINEERS LOCAL 4		06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
		12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
		06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
		12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
		06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
		12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"							
PAINTER (BRIDGES/TANKS)							
PAINTERS LOCAL 35 - ZONE 2		07/01/2015	\$48.56	\$7.85	\$16.10	\$0.00	\$72.51
		01/01/2016	\$49.51	\$7.85	\$16.10	\$0.00	\$73.46
		07/01/2016	\$50.46	\$7.85	\$16.10	\$0.00	\$74.41
		01/01/2017	\$51.41	\$7.85	\$16.10	\$0.00	\$75.36

Apprentice - PAINTER Local 35 - BRIDGES/TANKS**Effective Date - 07/01/2015**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.28	\$7.85	\$0.00	\$0.00	\$32.13
2	55	\$26.71	\$7.85	\$3.66	\$0.00	\$38.22
3	60	\$29.14	\$7.85	\$3.99	\$0.00	\$40.98
4	65	\$31.56	\$7.85	\$4.32	\$0.00	\$43.73
5	70	\$33.99	\$7.85	\$14.11	\$0.00	\$55.95
6	75	\$36.42	\$7.85	\$14.44	\$0.00	\$58.71
7	80	\$38.85	\$7.85	\$14.77	\$0.00	\$61.47
8	90	\$43.70	\$7.85	\$15.44	\$0.00	\$66.99

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.76	\$7.85	\$0.00	\$0.00	\$32.61
2	55	\$27.23	\$7.85	\$3.66	\$0.00	\$38.74
3	60	\$29.71	\$7.85	\$3.99	\$0.00	\$41.55
4	65	\$32.18	\$7.85	\$4.32	\$0.00	\$44.35
5	70	\$34.66	\$7.85	\$14.11	\$0.00	\$56.62
6	75	\$37.13	\$7.85	\$14.44	\$0.00	\$59.42
7	80	\$39.61	\$7.85	\$14.77	\$0.00	\$62.23
8	90	\$44.56	\$7.85	\$15.44	\$0.00	\$67.85

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, NEW) *

* If 30% or more of surfaces to be painted are new construction,

NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

07/01/2015	\$39.46	\$7.85	\$16.10	\$0.00	\$63.41
01/01/2016	\$40.41	\$7.85	\$16.10	\$0.00	\$64.36
07/01/2016	\$41.36	\$7.85	\$16.10	\$0.00	\$65.31
01/01/2017	\$42.31	\$7.85	\$16.10	\$0.00	\$66.26

Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - New**Effective Date - 07/01/2015**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.73	\$7.85	\$0.00	\$0.00	\$27.58
2	55	\$21.70	\$7.85	\$3.66	\$0.00	\$33.21
3	60	\$23.68	\$7.85	\$3.99	\$0.00	\$35.52
4	65	\$25.65	\$7.85	\$4.32	\$0.00	\$37.82
5	70	\$27.62	\$7.85	\$14.11	\$0.00	\$49.58
6	75	\$29.60	\$7.85	\$14.44	\$0.00	\$51.89
7	80	\$31.57	\$7.85	\$14.77	\$0.00	\$54.19
8	90	\$35.51	\$7.85	\$15.44	\$0.00	\$58.80

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.21	\$7.85	\$0.00	\$0.00	\$28.06
2	55	\$22.23	\$7.85	\$3.66	\$0.00	\$33.74
3	60	\$24.25	\$7.85	\$3.99	\$0.00	\$36.09
4	65	\$26.27	\$7.85	\$4.32	\$0.00	\$38.44
5	70	\$28.29	\$7.85	\$14.11	\$0.00	\$50.25
6	75	\$30.31	\$7.85	\$14.44	\$0.00	\$52.60
7	80	\$32.33	\$7.85	\$14.77	\$0.00	\$54.95
8	90	\$36.37	\$7.85	\$15.44	\$0.00	\$59.66

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (SPRAY OR SANDBLAST, REPAINT)	07/01/2015	\$37.52	\$7.85	\$16.10	\$0.00	\$61.47
PAINTERS LOCAL 35 - ZONE 2	01/01/2016	\$38.47	\$7.85	\$16.10	\$0.00	\$62.42
	07/01/2016	\$39.42	\$7.85	\$16.10	\$0.00	\$63.37
	01/01/2017	\$40.37	\$7.85	\$16.10	\$0.00	\$64.32

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - PAINTER Local 35 Zone 2 - Spray/Sandblast - Repaint
Effective Date - 07/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.76	\$7.85	\$0.00	\$0.00	\$26.61
2	55	\$20.64	\$7.85	\$3.66	\$0.00	\$32.15
3	60	\$22.51	\$7.85	\$3.99	\$0.00	\$34.35
4	65	\$24.39	\$7.85	\$4.32	\$0.00	\$36.56
5	70	\$26.26	\$7.85	\$14.11	\$0.00	\$48.22
6	75	\$28.14	\$7.85	\$14.44	\$0.00	\$50.43
7	80	\$30.02	\$7.85	\$14.77	\$0.00	\$52.64
8	90	\$33.77	\$7.85	\$15.44	\$0.00	\$57.06

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.24	\$7.85	\$0.00	\$0.00	\$27.09
2	55	\$21.16	\$7.85	\$3.66	\$0.00	\$32.67
3	60	\$23.08	\$7.85	\$3.99	\$0.00	\$34.92
4	65	\$25.01	\$7.85	\$4.32	\$0.00	\$37.18
5	70	\$26.93	\$7.85	\$14.11	\$0.00	\$48.89
6	75	\$28.85	\$7.85	\$14.44	\$0.00	\$51.14
7	80	\$30.78	\$7.85	\$14.77	\$0.00	\$53.40
8	90	\$34.62	\$7.85	\$15.44	\$0.00	\$57.91

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER (TRAFFIC MARKINGS)

LABORERS - ZONE 2

06/01/2015	\$31.15	\$7.30	\$12.30	\$0.00	\$50.75
12/01/2015	\$31.65	\$7.30	\$12.30	\$0.00	\$51.25
06/01/2016	\$32.15	\$7.30	\$12.30	\$0.00	\$51.75
12/01/2016	\$32.90	\$7.30	\$12.30	\$0.00	\$52.50

For Apprentice rates see "Apprentice- LABORER"

PAINTER / TAPER (BRUSH, NEW) *

* If 30% or more of surfaces to be painted are new construction,

NEW paint rate shall be used. PAINTERS LOCAL 35 - ZONE 2

07/01/2015	\$38.06	\$7.85	\$16.10	\$0.00	\$62.01
01/01/2016	\$39.01	\$7.85	\$16.10	\$0.00	\$62.96
07/01/2016	\$39.96	\$7.85	\$16.10	\$0.00	\$63.91
01/01/2017	\$40.91	\$7.85	\$16.10	\$0.00	\$64.86

Apprentice - PAINTER - Local 35 Zone 2 - BRUSH NEW**Effective Date - 07/01/2015**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.03	\$7.85	\$0.00	\$0.00	\$26.88
2	55	\$20.93	\$7.85	\$3.66	\$0.00	\$32.44
3	60	\$22.84	\$7.85	\$3.99	\$0.00	\$34.68
4	65	\$24.74	\$7.85	\$4.32	\$0.00	\$36.91
5	70	\$26.64	\$7.85	\$14.11	\$0.00	\$48.60
6	75	\$28.55	\$7.85	\$14.44	\$0.00	\$50.84
7	80	\$30.45	\$7.85	\$14.77	\$0.00	\$53.07
8	90	\$34.25	\$7.85	\$15.44	\$0.00	\$57.54

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$19.51	\$7.85	\$0.00	\$0.00	\$27.36
2	55	\$21.46	\$7.85	\$3.66	\$0.00	\$32.97
3	60	\$23.41	\$7.85	\$3.99	\$0.00	\$35.25
4	65	\$25.36	\$7.85	\$4.32	\$0.00	\$37.53
5	70	\$27.31	\$7.85	\$14.11	\$0.00	\$49.27
6	75	\$29.26	\$7.85	\$14.44	\$0.00	\$51.55
7	80	\$31.21	\$7.85	\$14.77	\$0.00	\$53.83
8	90	\$35.11	\$7.85	\$15.44	\$0.00	\$58.40

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PAINTER / TAPER (BRUSH, REPAINT)

PAINTERS LOCAL 35 - ZONE 2

07/01/2015	\$36.12	\$7.85	\$16.10	\$0.00	\$60.07
01/01/2016	\$37.07	\$7.85	\$16.10	\$0.00	\$61.02
07/01/2016	\$38.02	\$7.85	\$16.10	\$0.00	\$61.97
01/01/2017	\$38.97	\$7.85	\$16.10	\$0.00	\$62.92

Apprentice - PAINTER Local 35 Zone 2 - BRUSH REPAINT**Effective Date - 07/01/2015**

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.06	\$7.85	\$0.00	\$0.00	\$25.91
2	55	\$19.87	\$7.85	\$3.66	\$0.00	\$31.38
3	60	\$21.67	\$7.85	\$3.99	\$0.00	\$33.51
4	65	\$23.48	\$7.85	\$4.32	\$0.00	\$35.65
5	70	\$25.28	\$7.85	\$14.11	\$0.00	\$47.24
6	75	\$27.09	\$7.85	\$14.44	\$0.00	\$49.38
7	80	\$28.90	\$7.85	\$14.77	\$0.00	\$51.52
8	90	\$32.51	\$7.85	\$15.44	\$0.00	\$55.80

Effective Date - 01/01/2016

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$18.54	\$7.85	\$0.00	\$0.00	\$26.39
2	55	\$20.39	\$7.85	\$3.66	\$0.00	\$31.90
3	60	\$22.24	\$7.85	\$3.99	\$0.00	\$34.08
4	65	\$24.10	\$7.85	\$4.32	\$0.00	\$36.27
5	70	\$25.95	\$7.85	\$14.11	\$0.00	\$47.91
6	75	\$27.80	\$7.85	\$14.44	\$0.00	\$50.09
7	80	\$29.66	\$7.85	\$14.77	\$0.00	\$52.28
8	90	\$33.36	\$7.85	\$15.44	\$0.00	\$56.65

Notes:

Steps are 750 hrs.

Apprentice to Journeyworker Ratio:1:1

PANEL & PICKUP TRUCKS DRIVER <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	12/01/2012	\$30.28	\$9.07	\$8.00	\$0.00	\$47.35
PIER AND DOCK CONSTRUCTOR (UNDERPINNING AND DECK) <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2014	\$41.60	\$9.80	\$18.17	\$0.00	\$69.57
	08/01/2015	\$43.10	\$9.80	\$18.17	\$0.00	\$71.07
PILE DRIVER <i>PILE DRIVER LOCAL 56 (ZONE 1)</i>	08/01/2014	\$41.60	\$9.80	\$18.17	\$0.00	\$69.57
	08/01/2015	\$43.10	\$9.80	\$18.17	\$0.00	\$71.07

Classification

Effective Date Base Wage Health Pension Supplemental Unemployment Total Rate

Apprentice - PILE DRIVER - Local 56 Zone 1

Effective Date - 08/01/2014

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.80	\$9.80	\$18.17	\$0.00	\$48.77
2	60	\$24.96	\$9.80	\$18.17	\$0.00	\$52.93
3	70	\$29.12	\$9.80	\$18.17	\$0.00	\$57.09
4	75	\$31.20	\$9.80	\$18.17	\$0.00	\$59.17
5	80	\$33.28	\$9.80	\$18.17	\$0.00	\$61.25
6	80	\$33.28	\$9.80	\$18.17	\$0.00	\$61.25
7	90	\$37.44	\$9.80	\$18.17	\$0.00	\$65.41
8	90	\$37.44	\$9.80	\$18.17	\$0.00	\$65.41

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$21.55	\$9.80	\$18.17	\$0.00	\$49.52
2	60	\$25.86	\$9.80	\$18.17	\$0.00	\$53.83
3	70	\$30.17	\$9.80	\$18.17	\$0.00	\$58.14
4	75	\$32.33	\$9.80	\$18.17	\$0.00	\$60.30
5	80	\$34.48	\$9.80	\$18.17	\$0.00	\$62.45
6	80	\$34.48	\$9.80	\$18.17	\$0.00	\$62.45
7	90	\$38.79	\$9.80	\$18.17	\$0.00	\$66.76
8	90	\$38.79	\$9.80	\$18.17	\$0.00	\$66.76

Notes:

Apprentice to Journeyworker Ratio:1:3

PIPEFITTER & STEAMFITTER	03/01/2015	\$48.69	\$9.70	\$16.89	\$0.00	\$75.28
PIPEFITTERS LOCAL 537	09/01/2015	\$49.69	\$9.70	\$16.89	\$0.00	\$76.28
	03/01/2016	\$50.69	\$9.70	\$16.89	\$0.00	\$77.28
	09/01/2016	\$51.69	\$9.70	\$16.89	\$0.00	\$78.28
	03/01/2017	\$52.69	\$9.70	\$16.89	\$0.00	\$79.28

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - PIPEFITTER - Local 537
Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.48	\$9.70	\$7.50	\$0.00	\$36.68
2	45	\$21.91	\$9.70	\$16.89	\$0.00	\$48.50
3	60	\$29.21	\$9.70	\$16.89	\$0.00	\$55.80
4	70	\$34.08	\$9.70	\$16.89	\$0.00	\$60.67
5	80	\$38.95	\$9.70	\$16.89	\$0.00	\$65.54

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$19.88	\$9.70	\$7.50	\$0.00	\$37.08
2	45	\$22.36	\$9.70	\$16.89	\$0.00	\$48.95
3	60	\$29.81	\$9.70	\$16.89	\$0.00	\$56.40
4	70	\$34.78	\$9.70	\$16.89	\$0.00	\$61.37
5	80	\$39.75	\$9.70	\$16.89	\$0.00	\$66.34

Notes:

** 1:3; 3:15; 1:10 thereafter / Steps are 1 yr.

Refrig/AC Mechanic **1:1;1:2;2:4;3:6;4:8;5:10;6:12;7:14;8:17;9:20;10:23(Max)

Apprentice to Journeyworker Ratio:**

PIPELAYER	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
LABORERS - ZONE 2	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
PLUMBERS & GASFITTERS	03/01/2015	\$50.21	\$10.32	\$14.89	\$0.00	\$75.42
PLUMBERS & GASFITTERS LOCAL 12	09/01/2015	\$51.21	\$10.32	\$14.89	\$0.00	\$76.42
	03/01/2016	\$52.36	\$10.32	\$14.89	\$0.00	\$77.57
	09/01/2016	\$53.41	\$10.32	\$14.89	\$0.00	\$78.62
	03/01/2017	\$54.41	\$10.32	\$14.89	\$0.00	\$79.62

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - PLUMBER/GASFITTER - Local 12

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$17.57	\$10.32	\$5.54	\$0.00	\$33.43
2	40	\$20.08	\$10.32	\$6.27	\$0.00	\$36.67
3	55	\$27.62	\$10.32	\$8.42	\$0.00	\$46.36
4	65	\$32.64	\$10.32	\$9.87	\$0.00	\$52.83
5	75	\$37.66	\$10.32	\$11.30	\$0.00	\$59.28

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$17.92	\$10.32	\$5.54	\$0.00	\$33.78
2	40	\$20.48	\$10.32	\$6.27	\$0.00	\$37.07
3	55	\$28.17	\$10.32	\$8.42	\$0.00	\$46.91
4	65	\$33.29	\$10.32	\$9.87	\$0.00	\$53.48
5	75	\$38.41	\$10.32	\$11.30	\$0.00	\$60.03

Notes:

** 1:2; 2:6; 3:10; 4:14; 5:19/Steps are 1 yr
Step4 with lic\$56.05 Step5 with lic\$62.48

Apprentice to Journeyworker Ratio:**

PNEUMATIC CONTROLS (TEMP.)	03/01/2015	\$48.69	\$9.70	\$16.89	\$0.00	\$75.28
PIPEFITTERS LOCAL 537	09/01/2015	\$49.69	\$9.70	\$16.89	\$0.00	\$76.28
	03/01/2016	\$50.69	\$9.70	\$16.89	\$0.00	\$77.28
	09/01/2016	\$51.69	\$9.70	\$16.89	\$0.00	\$78.28
	03/01/2017	\$52.69	\$9.70	\$16.89	\$0.00	\$79.28

For apprentice rates see "Apprentice- PIPEFITTER" or "PLUMBER/PIPEFITTER"

PNEUMATIC DRILL/TOOL OPERATOR	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
LABORERS - ZONE 2	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75

For apprentice rates see "Apprentice- LABORER"

POWDERMAN & BLASTER	06/01/2015	\$32.15	\$7.30	\$12.30	\$0.00	\$51.75
LABORERS - ZONE 2	12/01/2015	\$32.65	\$7.30	\$12.30	\$0.00	\$52.25
	06/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
	12/01/2016	\$33.90	\$7.30	\$12.30	\$0.00	\$53.50

For apprentice rates see "Apprentice- LABORER"

POWER SHOVEL/DERRICK/TRENCHING MACHINE	06/01/2015	\$42.83	\$10.00	\$14.55	\$0.00	\$67.38
OPERATING ENGINEERS LOCAL 4	12/01/2015	\$44.08	\$10.00	\$14.55	\$0.00	\$68.63
	06/01/2016	\$44.83	\$10.00	\$14.55	\$0.00	\$69.38
	12/01/2016	\$46.08	\$10.00	\$14.55	\$0.00	\$70.63
	06/01/2017	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
	12/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
PUMP OPERATOR (CONCRETE) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$42.83	\$10.00	\$14.55	\$0.00	\$67.38
	12/01/2015	\$44.08	\$10.00	\$14.55	\$0.00	\$68.63
	06/01/2016	\$44.83	\$10.00	\$14.55	\$0.00	\$69.38
	12/01/2016	\$46.08	\$10.00	\$14.55	\$0.00	\$70.63
	06/01/2017	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
	12/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
PUMP OPERATOR (DEWATERING, OTHER) <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$29.61	\$10.00	\$14.55	\$0.00	\$54.16
	12/01/2015	\$30.48	\$10.00	\$14.55	\$0.00	\$55.03
	06/01/2016	\$31.00	\$10.00	\$14.55	\$0.00	\$55.55
	12/01/2016	\$31.87	\$10.00	\$14.55	\$0.00	\$56.42
	06/01/2017	\$32.56	\$10.00	\$14.55	\$0.00	\$57.11
	12/01/2017	\$33.25	\$10.00	\$14.55	\$0.00	\$57.80
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
READY-MIX CONCRETE DRIVER <i>TEAMSTERS LOCAL 49</i>	05/01/2010	\$22.88	\$6.97	\$3.94	\$0.00	\$33.79
RECLAIMERS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
	12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
	06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
	12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
	06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
	12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
RESIDENTIAL WOOD FRAME (All Other Work) <i>CARPENTERS -ZONE 2 (Residential Wood)</i>	04/01/2011	\$24.24	\$8.67	\$15.51	\$0.00	\$48.42
RESIDENTIAL WOOD FRAME CARPENTER **	05/01/2011	\$24.24	\$6.34	\$6.23	\$0.00	\$36.81
** The Residential Wood Frame Carpenter classification applies only to the construction of new, wood frame residences that do not exceed four stories including the basement. <i>CARPENTERS -ZONE 2 (Residential Wood)</i> As of 9/1/09 Carpentry work on wood-frame residential WEATHERIZATION projects shall be paid the RESIDENTIAL WOOD FRAME CARPENTER rate.						

Apprentice - CARPENTER (Residential Wood Frame) - Zone 2

Effective Date - 05/01/2011

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$14.54	\$6.34	\$0.00	\$0.00	\$20.88
2	60	\$14.54	\$6.34	\$6.23	\$0.00	\$27.11
3	65	\$15.76	\$6.34	\$6.23	\$0.00	\$28.33
4	70	\$16.97	\$6.34	\$6.23	\$0.00	\$29.54
5	75	\$18.18	\$6.34	\$6.23	\$0.00	\$30.75
6	80	\$19.39	\$6.34	\$6.23	\$0.00	\$31.96
7	85	\$20.60	\$6.34	\$6.23	\$0.00	\$33.17
8	90	\$21.82	\$6.34	\$6.23	\$0.00	\$34.39

Notes:

Apprentice to Journeyworker Ratio:1:5

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
RIDE-ON MOTORIZED BUGGY OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
ROLLER/SPREADER/MULCHING MACHINE <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
	12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
	06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
	12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
	06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
	12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						
ROOFER (Inc.Roofing Waterproofing &Roofing Damproofg) <i>ROOFERS LOCAL 33</i>	02/01/2015	\$40.11	\$10.50	\$11.60	\$0.00	\$62.21
	08/01/2015	\$41.01	\$10.50	\$11.60	\$0.00	\$63.11
	02/01/2016	\$41.91	\$10.50	\$11.60	\$0.00	\$64.01

Apprentice - ROOFER - Local 33

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.06	\$10.50	\$3.38	\$0.00	\$33.94
2	60	\$24.07	\$10.50	\$11.60	\$0.00	\$46.17
3	65	\$26.07	\$10.50	\$11.60	\$0.00	\$48.17
4	75	\$30.08	\$10.50	\$11.60	\$0.00	\$52.18
5	85	\$34.09	\$10.50	\$11.60	\$0.00	\$56.19

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$20.51	\$10.50	\$3.38	\$0.00	\$34.39
2	60	\$24.61	\$10.50	\$11.60	\$0.00	\$46.71
3	65	\$26.66	\$10.50	\$11.60	\$0.00	\$48.76
4	75	\$30.76	\$10.50	\$11.60	\$0.00	\$52.86
5	85	\$34.86	\$10.50	\$11.60	\$0.00	\$56.96

Notes: ** 1:5, 2:6-10, the 1:10; Reroofing: 1:4, then 1:1
Step 1 is 2000 hrs.; Steps 2-5 are 1000 hrs.

Apprentice to Journeyworker Ratio:**

ROOFER SLATE / TILE / PRECAST CONCRETE <i>ROOFERS LOCAL 33</i>	02/01/2015	\$40.36	\$10.50	\$11.60	\$0.00	\$62.46
	08/01/2015	\$41.26	\$10.50	\$11.60	\$0.00	\$63.36
	02/01/2016	\$42.16	\$10.50	\$11.60	\$0.00	\$64.26

For apprentice rates see "Apprentice- ROOFER"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
SHEETMETAL WORKER	02/01/2015	\$43.28	\$10.20	\$20.54	\$2.22	\$76.24
<i>SHEETMETAL WORKERS LOCAL 17 - A</i>	08/01/2015	\$43.31	\$10.20	\$21.48	\$2.25	\$77.24
	02/01/2016	\$44.31	\$10.20	\$21.48	\$2.25	\$78.24
	08/01/2016	\$45.46	\$10.20	\$21.48	\$2.25	\$79.39
	02/01/2017	\$46.56	\$10.20	\$21.48	\$2.25	\$80.49
	08/01/2017	\$47.66	\$10.20	\$21.48	\$2.25	\$81.59
	02/01/2018	\$48.81	\$10.20	\$21.48	\$2.25	\$82.74

Apprentice - SHEET METAL WORKER - Local 17-A

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.31	\$10.20	\$4.58	\$0.00	\$32.09
2	40	\$17.31	\$10.20	\$4.58	\$0.00	\$32.09
3	45	\$19.48	\$10.20	\$9.09	\$1.16	\$39.93
4	45	\$19.48	\$10.20	\$9.09	\$1.16	\$39.93
5	50	\$21.64	\$10.20	\$9.91	\$1.25	\$43.00
6	50	\$21.64	\$10.20	\$10.16	\$1.26	\$43.26
7	60	\$25.97	\$10.20	\$11.55	\$1.43	\$49.15
8	65	\$28.13	\$10.20	\$12.38	\$1.52	\$52.23
9	75	\$32.46	\$10.20	\$14.02	\$1.70	\$58.38
10	85	\$36.79	\$10.20	\$15.16	\$1.86	\$64.01

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$17.32	\$10.20	\$4.90	\$0.00	\$32.42
2	40	\$17.32	\$10.20	\$4.90	\$0.00	\$32.42
3	45	\$19.49	\$10.20	\$9.59	\$1.18	\$40.46
4	45	\$19.49	\$10.20	\$9.59	\$1.18	\$40.46
5	50	\$21.66	\$10.20	\$10.45	\$1.27	\$43.58
6	50	\$21.66	\$10.20	\$10.70	\$1.28	\$43.84
7	60	\$25.99	\$10.20	\$12.17	\$1.45	\$49.81
8	65	\$28.15	\$10.20	\$13.04	\$1.54	\$52.93
9	75	\$32.48	\$10.20	\$14.76	\$1.72	\$59.16
10	85	\$36.81	\$10.20	\$15.98	\$1.89	\$64.88

Notes:

Steps are 6 mos.

Apprentice to Journeyworker Ratio:1:4

SIGN ERECTOR	06/01/2013	\$25.81	\$7.07	\$7.05	\$0.00	\$39.93
<i>PAINTERS LOCAL 35 - ZONE 2</i>						

Classification
Effective Date
Base Wage
Health
Pension
**Supplemental
Unemployment**
Total Rate
Apprentice - SIGN ERECTOR - Local 35 Zone 2
Effective Date - 06/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$12.91	\$7.07	\$0.00	\$0.00	\$19.98
2	55	\$14.20	\$7.07	\$2.45	\$0.00	\$23.72
3	60	\$15.49	\$7.07	\$2.45	\$0.00	\$25.01
4	65	\$16.78	\$7.07	\$2.45	\$0.00	\$26.30
5	70	\$18.07	\$7.07	\$7.05	\$0.00	\$32.19
6	75	\$19.36	\$7.07	\$7.05	\$0.00	\$33.48
7	80	\$20.65	\$7.07	\$7.05	\$0.00	\$34.77
8	85	\$21.94	\$7.07	\$7.05	\$0.00	\$36.06
9	90	\$23.23	\$7.07	\$7.05	\$0.00	\$37.35

Notes:

Steps are 4 mos.

Apprentice to Journeyworker Ratio:1:1
SPECIALIZED EARTH MOVING EQUIP < 35 TONS
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B

06/01/2015	\$31.94	\$9.91	\$9.33	\$0.00	\$51.18
08/01/2015	\$31.94	\$10.41	\$9.33	\$0.00	\$51.68
12/01/2015	\$31.94	\$10.41	\$10.08	\$0.00	\$52.43
06/01/2016	\$32.44	\$10.41	\$10.08	\$0.00	\$52.93
08/01/2016	\$32.44	\$10.91	\$10.08	\$0.00	\$53.43
12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24

SPECIALIZED EARTH MOVING EQUIP > 35 TONS
TEAMSTERS JOINT COUNCIL NO. 10 ZONE B

06/01/2015	\$32.23	\$9.91	\$9.33	\$0.00	\$51.47
08/01/2015	\$32.23	\$10.41	\$9.33	\$0.00	\$51.97
12/01/2015	\$32.23	\$10.41	\$10.08	\$0.00	\$52.72
06/01/2016	\$32.73	\$10.41	\$10.08	\$0.00	\$53.22
08/01/2016	\$32.73	\$10.91	\$10.08	\$0.00	\$53.72
12/01/2016	\$32.73	\$10.91	\$10.89	\$0.00	\$54.53

SPRINKLER FITTER
SPRINKLER FITTERS LOCAL 550 - (Section A) Zone 1

03/01/2015	\$54.43	\$8.42	\$14.90	\$0.00	\$77.75
10/01/2015	\$55.58	\$8.42	\$14.90	\$0.00	\$78.90
01/01/2016	\$55.58	\$8.67	\$15.05	\$0.00	\$79.30
03/01/2016	\$56.58	\$8.67	\$15.05	\$0.00	\$80.30
10/01/2016	\$57.73	\$8.67	\$15.05	\$0.00	\$81.45
03/01/2017	\$58.73	\$8.67	\$15.05	\$0.00	\$82.45

Classification

Effective Date

Base Wage

Health

Pension

Supplemental
Unemployment

Total Rate

Apprentice - SPRINKLER FITTER - Local 550 (Section A) Zone 1**Effective Date -** 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$19.05	\$8.42	\$8.40	\$0.00	\$35.87
2	40	\$21.77	\$8.42	\$8.40	\$0.00	\$38.59
3	45	\$24.49	\$8.42	\$8.40	\$0.00	\$41.31
4	50	\$27.22	\$8.42	\$8.40	\$0.00	\$44.04
5	55	\$29.94	\$8.42	\$8.40	\$0.00	\$46.76
6	60	\$32.66	\$8.42	\$8.40	\$0.00	\$49.48
7	65	\$35.38	\$8.42	\$8.40	\$0.00	\$52.20
8	70	\$38.10	\$8.42	\$8.40	\$0.00	\$54.92
9	75	\$40.82	\$8.42	\$8.40	\$0.00	\$57.64
10	80	\$43.54	\$8.42	\$8.40	\$0.00	\$60.36

Effective Date - 10/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	35	\$19.45	\$8.42	\$8.40	\$0.00	\$36.27
2	40	\$22.23	\$8.42	\$8.40	\$0.00	\$39.05
3	45	\$25.01	\$8.42	\$8.40	\$0.00	\$41.83
4	50	\$27.79	\$8.42	\$8.40	\$0.00	\$44.61
5	55	\$30.57	\$8.42	\$8.40	\$0.00	\$47.39
6	60	\$33.35	\$8.42	\$8.40	\$0.00	\$50.17
7	65	\$36.13	\$8.42	\$8.40	\$0.00	\$52.95
8	70	\$38.91	\$8.42	\$8.40	\$0.00	\$55.73
9	75	\$41.69	\$8.42	\$8.40	\$0.00	\$58.51
10	80	\$44.46	\$8.42	\$8.40	\$0.00	\$61.28

Notes: Apprentice entered prior 9/30/10:
40/45/50/55/60/65/70/75/80/85
Steps are 850 hours

Apprentice to Journeyworker Ratio:1:3**STEAM BOILER OPERATOR***OPERATING ENGINEERS LOCAL 4*

06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

TAMPERS, SELF-PROPELLED OR TRACTOR DRAWN*OPERATING ENGINEERS LOCAL 4*

06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17

For apprentice rates see "Apprentice- OPERATING ENGINEERS"

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELECOMMUNICATION TECHNICIAN <i>ELECTRICIANS LOCAL 103</i>	03/01/2015	\$33.88	\$13.00	\$13.70	\$0.00	\$60.58
	09/01/2015	\$34.60	\$13.00	\$13.72	\$0.00	\$61.32
	03/01/2016	\$35.31	\$13.00	\$13.74	\$0.00	\$62.05

Apprentice - TELECOMMUNICATION TECHNICIAN - Local 103

Effective Date - 03/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$13.55	\$13.00	\$0.41	\$0.00	\$26.96
2	40	\$13.55	\$13.00	\$0.41	\$0.00	\$26.96
3	45	\$15.25	\$13.00	\$10.87	\$0.00	\$39.12
4	45	\$15.25	\$13.00	\$10.87	\$0.00	\$39.12
5	50	\$16.94	\$13.00	\$11.11	\$0.00	\$41.05
6	55	\$18.63	\$13.00	\$11.38	\$0.00	\$43.01
7	60	\$20.33	\$13.00	\$11.64	\$0.00	\$44.97
8	65	\$22.02	\$13.00	\$11.89	\$0.00	\$46.91
9	70	\$23.72	\$13.00	\$12.15	\$0.00	\$48.87
10	75	\$25.41	\$13.00	\$12.41	\$0.00	\$50.82

Effective Date - 09/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	40	\$13.84	\$13.00	\$0.42	\$0.00	\$27.26
2	40	\$13.84	\$13.00	\$0.42	\$0.00	\$27.26
3	45	\$15.57	\$13.00	\$10.88	\$0.00	\$39.45
4	45	\$15.57	\$13.00	\$10.88	\$0.00	\$39.45
5	50	\$17.30	\$13.00	\$11.14	\$0.00	\$41.44
6	55	\$19.03	\$13.00	\$11.39	\$0.00	\$43.42
7	60	\$20.76	\$13.00	\$11.65	\$0.00	\$45.41
8	65	\$22.49	\$13.00	\$11.90	\$0.00	\$47.39
9	70	\$24.22	\$13.00	\$12.17	\$0.00	\$49.39
10	75	\$25.95	\$13.00	\$12.43	\$0.00	\$51.38

Notes:

Apprentice to Journeyworker Ratio:1:1

TERRAZZO FINISHERS <i>BRICKLAYERS LOCAL 3 - MARBLE & TILE</i>	02/01/2015	\$47.90	\$10.18	\$18.50	\$0.00	\$76.58
	08/01/2015	\$48.80	\$10.18	\$18.57	\$0.00	\$77.55
	02/01/2016	\$49.37	\$10.18	\$18.57	\$0.00	\$78.12
	08/01/2016	\$50.27	\$10.18	\$18.65	\$0.00	\$79.10
	02/01/2017	\$50.84	\$10.18	\$18.65	\$0.00	\$79.67

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
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Apprentice - TERRAZZO FINISHER - Local 3 Marble & Tile

Effective Date - 02/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$23.95	\$10.18	\$18.50	\$0.00	\$52.63
2	60	\$28.74	\$10.18	\$18.50	\$0.00	\$57.42
3	70	\$33.53	\$10.18	\$18.50	\$0.00	\$62.21
4	80	\$38.32	\$10.18	\$18.50	\$0.00	\$67.00
5	90	\$43.11	\$10.18	\$18.50	\$0.00	\$71.79

Effective Date - 08/01/2015

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	50	\$24.40	\$10.18	\$18.57	\$0.00	\$53.15
2	60	\$29.28	\$10.18	\$18.57	\$0.00	\$58.03
3	70	\$34.16	\$10.18	\$18.57	\$0.00	\$62.91
4	80	\$39.04	\$10.18	\$18.57	\$0.00	\$67.79
5	90	\$43.92	\$10.18	\$18.57	\$0.00	\$72.67

Notes:

Apprentice to Journeyworker Ratio:1:3

TEST BORING DRILLER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2015	\$36.45	\$7.30	\$13.40	\$0.00	\$57.15
	12/01/2015	\$37.20	\$7.30	\$13.40	\$0.00	\$57.90
	06/01/2016	\$37.95	\$7.30	\$13.40	\$0.00	\$58.65
	12/01/2016	\$38.95	\$7.30	\$13.40	\$0.00	\$59.65
For apprentice rates see "Apprentice- LABORER"						
TEST BORING DRILLER HELPER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2015	\$35.17	\$7.30	\$13.40	\$0.00	\$55.87
	12/01/2015	\$35.92	\$7.30	\$13.40	\$0.00	\$56.62
	06/01/2016	\$36.67	\$7.30	\$13.40	\$0.00	\$57.37
	12/01/2016	\$37.67	\$7.30	\$13.40	\$0.00	\$58.37
For apprentice rates see "Apprentice- LABORER"						
TEST BORING LABORER <i>LABORERS - FOUNDATION AND MARINE</i>	06/01/2015	\$35.05	\$7.30	\$13.40	\$0.00	\$55.75
	12/01/2015	\$35.80	\$7.30	\$13.40	\$0.00	\$56.50
	06/01/2016	\$36.55	\$7.30	\$13.40	\$0.00	\$57.25
	12/01/2016	\$37.55	\$7.30	\$13.40	\$0.00	\$58.25
For apprentice rates see "Apprentice- LABORER"						
TRACTORS/PORTABLE STEAM GENERATORS <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$42.42	\$10.00	\$14.55	\$0.00	\$66.97
	12/01/2015	\$43.66	\$10.00	\$14.55	\$0.00	\$68.21
	06/01/2016	\$44.41	\$10.00	\$14.55	\$0.00	\$68.96
	12/01/2016	\$45.64	\$10.00	\$14.55	\$0.00	\$70.19
	06/01/2017	\$46.63	\$10.00	\$14.55	\$0.00	\$71.18
	12/01/2017	\$47.62	\$10.00	\$14.55	\$0.00	\$72.17
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TRAILERS FOR EARTH MOVING EQUIPMENT <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2015	\$32.52	\$9.91	\$9.33	\$0.00	\$51.76
	08/01/2015	\$32.52	\$10.41	\$9.33	\$0.00	\$52.26
	12/01/2015	\$32.52	\$10.41	\$10.08	\$0.00	\$53.01
	06/01/2016	\$33.02	\$10.41	\$10.08	\$0.00	\$53.51
	08/01/2016	\$33.02	\$10.91	\$10.08	\$0.00	\$54.01
	12/01/2016	\$33.02	\$10.91	\$10.89	\$0.00	\$54.82
TUNNEL WORK - COMPRESSED AIR <i>LABORERS (COMPRESSED AIR)</i>	06/01/2015	\$47.33	\$7.30	\$13.80	\$0.00	\$68.43
	12/01/2015	\$48.08	\$7.30	\$13.80	\$0.00	\$69.18
	06/01/2016	\$48.83	\$7.30	\$13.80	\$0.00	\$69.93
	12/01/2016	\$49.83	\$7.30	\$13.80	\$0.00	\$70.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - COMPRESSED AIR (HAZ. WASTE) <i>LABORERS (COMPRESSED AIR)</i>	06/01/2015	\$49.33	\$7.30	\$13.80	\$0.00	\$70.43
	12/01/2015	\$50.08	\$7.30	\$13.80	\$0.00	\$71.18
	06/01/2016	\$50.83	\$7.30	\$13.80	\$0.00	\$71.93
	12/01/2016	\$51.83	\$7.30	\$13.80	\$0.00	\$72.93
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2015	\$39.40	\$7.30	\$13.80	\$0.00	\$60.50
	12/01/2015	\$40.15	\$7.30	\$13.80	\$0.00	\$61.25
	06/01/2016	\$40.90	\$7.30	\$13.80	\$0.00	\$62.00
	12/01/2016	\$41.90	\$7.30	\$13.80	\$0.00	\$63.00
For apprentice rates see "Apprentice- LABORER"						
TUNNEL WORK - FREE AIR (HAZ. WASTE) <i>LABORERS (FREE AIR TUNNEL)</i>	06/01/2015	\$41.40	\$7.30	\$13.80	\$0.00	\$62.50
	12/01/2015	\$42.15	\$7.30	\$13.80	\$0.00	\$63.25
	06/01/2016	\$42.90	\$7.30	\$13.80	\$0.00	\$64.00
	12/01/2016	\$43.90	\$7.30	\$13.80	\$0.00	\$65.00
For apprentice rates see "Apprentice- LABORER"						
VAC-HAUL <i>TEAMSTERS JOINT COUNCIL NO. 10 ZONE B</i>	06/01/2015	\$31.94	\$9.91	\$9.33	\$0.00	\$51.18
	08/01/2015	\$31.94	\$10.41	\$9.33	\$0.00	\$51.68
	12/01/2015	\$31.94	\$10.41	\$10.08	\$0.00	\$52.43
	06/01/2016	\$32.44	\$10.41	\$10.08	\$0.00	\$52.93
	08/01/2016	\$32.44	\$10.91	\$10.08	\$0.00	\$53.43
	12/01/2016	\$32.44	\$10.91	\$10.89	\$0.00	\$54.24
WAGON DRILL OPERATOR <i>LABORERS - ZONE 2</i>	06/01/2015	\$31.40	\$7.30	\$12.30	\$0.00	\$51.00
	12/01/2015	\$31.90	\$7.30	\$12.30	\$0.00	\$51.50
	06/01/2016	\$32.40	\$7.30	\$12.30	\$0.00	\$52.00
	12/01/2016	\$33.15	\$7.30	\$12.30	\$0.00	\$52.75
For apprentice rates see "Apprentice- LABORER"						
WASTE WATER PUMP OPERATOR <i>OPERATING ENGINEERS LOCAL 4</i>	06/01/2015	\$42.83	\$10.00	\$14.55	\$0.00	\$67.38
	12/01/2015	\$44.08	\$10.00	\$14.55	\$0.00	\$68.63
	06/01/2016	\$44.83	\$10.00	\$14.55	\$0.00	\$69.38
	12/01/2016	\$46.08	\$10.00	\$14.55	\$0.00	\$70.63
	06/01/2017	\$47.08	\$10.00	\$14.55	\$0.00	\$71.63
	12/01/2017	\$48.08	\$10.00	\$14.55	\$0.00	\$72.63
For apprentice rates see "Apprentice- OPERATING ENGINEERS"						

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
WATER METER INSTALLER <i>PLUMBERS & GASFITTERS LOCAL 12</i>	03/01/2015	\$50.21	\$10.32	\$14.89	\$0.00	\$75.42
	09/01/2015	\$51.21	\$10.32	\$14.89	\$0.00	\$76.42
	03/01/2016	\$52.36	\$10.32	\$14.89	\$0.00	\$77.57
	09/01/2016	\$53.41	\$10.32	\$14.89	\$0.00	\$78.62
	03/01/2017	\$54.41	\$10.32	\$14.89	\$0.00	\$79.62
For apprentice rates see "Apprentice- PLUMBER/PIPEFITTER" or "PLUMBER/GASFITTER"						
Outside Electrical - East						
CABLE TECHNICIAN (Power Zone) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$25.66	\$8.70	\$4.48	\$0.00	\$38.84
For apprentice rates see "Apprentice- LINEMAN"						
CABLEMAN (Underground Ducts & Cables) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$36.55	\$8.70	\$6.58	\$0.00	\$51.83
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN CDL <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$29.94	\$8.70	\$6.05	\$0.00	\$44.69
For apprentice rates see "Apprentice- LINEMAN"						
DRIVER / GROUNDMAN -Inexperienced (<2000 Hrs) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$23.52	\$8.70	\$5.24	\$0.00	\$37.46
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class A CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$36.35	\$8.70	\$9.43	\$0.00	\$54.48
For apprentice rates see "Apprentice- LINEMAN"						
EQUIPMENT OPERATOR (Class B CDL) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$32.08	\$8.70	\$6.59	\$0.00	\$47.37
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$23.52	\$8.70	\$3.72	\$0.00	\$35.94
For apprentice rates see "Apprentice- LINEMAN"						
GROUNDMAN -Inexperienced (<2000 Hrs.) <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$19.25	\$8.70	\$2.85	\$0.00	\$30.80
For apprentice rates see "Apprentice- LINEMAN"						
JOURNEYMAN LINEMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	09/01/2013	\$42.77	\$8.70	\$11.78	\$0.00	\$63.25

Apprentice - LINEMAN (Outside Electrical) - East Local 104

Effective Date - 09/01/2013

Step	percent	Apprentice Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
1	60	\$25.66	\$8.70	\$4.24	\$0.00	\$38.60
2	65	\$27.80	\$8.70	\$4.71	\$0.00	\$41.21
3	70	\$29.94	\$8.70	\$5.43	\$0.00	\$44.07
4	75	\$32.08	\$8.70	\$6.16	\$0.00	\$46.94
5	80	\$34.22	\$8.70	\$6.88	\$0.00	\$49.80
6	85	\$36.35	\$8.70	\$7.62	\$0.00	\$52.67
7	90	\$38.49	\$8.70	\$8.83	\$0.00	\$56.02

Notes:

Apprentice to Journeyworker Ratio:1:2

Classification	Effective Date	Base Wage	Health	Pension	Supplemental Unemployment	Total Rate
TELEDATA CABLE SPLICER <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/01/2015	\$28.12	\$4.25	\$3.09	\$0.00	\$35.46
	01/01/2016	\$28.98	\$4.25	\$3.12	\$0.00	\$36.35
TELEDATA LINEMAN/EQUIPMENT OPERATOR <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/01/2015	\$26.49	\$4.25	\$3.04	\$0.00	\$33.78
	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TELEDATA WIREMAN/INSTALLER/TECHNICIAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	01/01/2015	\$26.49	\$4.25	\$3.04	\$0.00	\$33.78
	01/01/2016	\$27.31	\$4.25	\$3.07	\$0.00	\$34.63
TREE TRIMMER <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/01/2015	\$18.05	\$3.55	\$0.00	\$0.00	\$21.60
	01/31/2016	\$18.51	\$3.55	\$0.00	\$0.00	\$22.06
This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is not on the ground. This classification does not apply to wholesale tree removal.						
TREE TRIMMER GROUNDMAN <i>OUTSIDE ELECTRICAL WORKERS - EAST LOCAL 104</i>	02/01/2015	\$15.92	\$3.55	\$0.00	\$0.00	\$19.47
	01/31/2016	\$16.32	\$3.55	\$0.00	\$0.00	\$19.87
This classification applies only to tree work done: (a) for a utility company, R.E.A. cooperative, or railroad or coal mining company, and (b) for the purpose of operating, maintaining, or repairing the utility company's equipment, and (c) by a person who is using hand or mechanical cutting methods and is on the ground. This classification does not apply to wholesale tree removal.						

Additional Apprentices Information:

Minimum wage rates for apprentices employed on public works projects are listed above as a percentage of the pre-determined hourly wage rate established by the Commissioner under the provisions of the M.G.L. c. 149, ss. 26-27D. Apprentice ratios are established by the Division of Apprenticeship Training pursuant to M.G.L. c. 23, ss. 11E-11L.

All apprentices must be registered with the Division of Apprenticeship Training in accordance with M.G.L. c. 23, ss. 11E-11L.

All steps are six months (1000 hours.)

Ratios are expressed in allowable number of apprentices to journeymen or fraction thereof, unless otherwise specified.

** Multiple ratios are listed in the comment field.

*** APP to JM; 1:1, 2:2, 2:3, 3:4, 4:4, 4:5, 4:6, 5:7, 6:7, 6:8, 6:9, 7:10, 8:10, 8:11, 8:12, 9:13, 10:13, 10:14, etc.

**** APP to JM; 1:1, 1:2, 2:3, 2:4, 3:5, 4:6, 4:7, 5:8, 6:9, 6:10, 7:11, 8:12, 8:13, 9:14, 10:15, 10:16, etc.

SECTION 011110 - SUMMARY OF WORK - RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 PROJECT DESCRIPTION

- A. Work will be performed at locations within parking structures as shown on Drawings.
- B. Work required in these areas and estimated quantities are listed on Bid Form. Bid Quantities associated with Work Items listed on Drawings have been estimated and are subject to measurement as defined in Article "Measurements." Where additional Work Items are described, but not specifically located and/or shown on Drawings, Contractor shall be responsible for locating and marking areas to be repaired. Owner and/or Engineer/Architect reserves right to increase or decrease quantities up to 25% at same unit cost, as required by job conditions.
- C. Work Item specifications and details shall govern all repair operations. Locations where Work Items apply are shown on Drawings as symbols.
- D. Final payment shall be made on basis of actual approved Work performed as measured in place.
- E. Project comprises the restoration of the Leo A. Roy and Lower Locks Parking Garages for the City of Lowell, MA.
- F. Work at the Leo A. Roy Parking Garage consists of the following:
 - 1. Work includes concrete repairs to the floor slabs, beams and columns, post-tensioning repair, waterproofing of the floor slabs, expansion seal replacement, masonry repairs, drainage system repairs, fire standpipe replacement and other miscellaneous work
- G. Work at the Lower Locks Parking Garage consists of the following:
 - 1. Work includes concrete repairs to the precast floors and framing members, cast-in-place concrete repairs, joint sealant replacement, expansion seal replacement, masonry repairs, drainage replacement, fire standpipe replacement and other miscellaneous work.

1.3 MEASUREMENTS

- A. Before ordering any material or doing any Work, Contractor shall verify all measurements at Project site and shall be responsible for correctness of same.
- B. Before proceeding with each Work Item, Contractor shall locate, mark, and measure quantity of each item and report quantities to Engineer/Architect. If measured quantities exceed Engineer/Architect's estimate, Contractor shall obtain written authorization to proceed from Owner before executing Work required for that Work Item.
- C. Measurement of quantities for individual Work Items will be performed by Contractor and reviewed by Engineer/Architect. Coordinate measurements with inspection as required in Section "Project Management and Coordination."
- D. Cost of Work included in each Work Item for quantities as indicated in Contract Documents shall be included in Base Bid.
 - 1. Additions to or deductions from lump sum price for quantities of each Work Item added to or deducted from Work respectively shall be at unit prices indicated in Bid Form and shall constitute payment or deductions in full for all material, equipment, labor, supervision and incidentals necessary to complete Work.

1.4 WORK SEQUENCE

- A. Prior to commencement of work, meet with Engineer/Architect and Owner representatives to establish sequence and schedule of Work. Contractor shall give Owner notice of areas to be cleared of cars at least 2 working days in advance of actual Work.
- B. Contractor shall notify Owner's representative at least 24 hr prior to beginning any abrasive blasting operations.
- C. Contractor shall remove all broken concrete and debris from Work area on daily basis and dispose of same at authorized dump sites.
- D. Contractor shall remove dust and air transported sand/debris from remainder of facility at conclusion of operations in Work area.

1.5 CONTRACTOR USE OF PREMISES

- A. General: Limit use of premises to construction activities in areas indicated; allow for Owner occupancy and use by public.
 - 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
 - 2. Keep driveways and entrances serving the premises clear and available to the Owner and Owner's employees at all times. Do not use these areas for parking

or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

- B. Contractor's use of premises shall not interfere with operation of same. Elevators shall not be used for transfer of materials or equipment.
- C. Contractor's debris removal path shall be over non-repaired services unless physical restraints prevent use of such path.
- D. Contractor shall confine its apparatus, materials, equipment, tool cribs, field offices and operations to areas designated by Owner and/or Engineer/Architect. Premises shall not be unreasonably encumbered with materials and equipment. Neat and orderly stockpiling and other operations shall be maintained and debris shall be regularly removed from site. Contractor shall not load or permit any part of structure to be loaded with weight that will endanger structural integrity or safety of facility. Contractor shall limit axle loads to maximum 4000 lb per axle and gross weight of 8000 lb, or stockpiling of materials and equipment to 50 lb per sq ft. Contractor to note existing height restrictions within parking structure.
- E. Contractor Parking: Contractor's employees shall park within confines of work area.
- F. On-Site Storage: Contractor shall not store materials or equipment at site of Work for more than one week prior to time that materials or equipment are incorporated into Work.

1.6 BARRICADES

- A. Minimum acceptable separation for Work Zone and Protection Zone (all Levels): 4 ft. 0 in. high solid temporary barrier constructed of wood with full height polyurethane tarpaulins or 6 ft. 0 in. high temporary fencing with full height polyurethane tarpaulins. Wood barricades shall be painted safety yellow on side facing public operating side. Temporary construction fence shall have orange screening securely attached to side facing public operating side. Tarpaulins must be secured to prevent the passage of airborne dust from within the Work Zone and Protection Zone (may include building perimeter).

1.7 TRAFFIC OFFICERS AND FLAGMEN

- A. When, in Owner's opinion, it is necessary that uniformed police or security officers be used to protect and control pedestrian traffic, to direct vehicular traffic during construction and to keep traffic off any part of Work, or to protect public safety, a police/security detail will be obtained. All expenses for uniformed officers shall be assumed by Contractor and included in bid price or in prices bid for items of Work to be performed under this Contract.

1.8 CLAIMS

- A. Contractor shall promptly address all damages claims. Owner reserves right to resolve any claims not addressed by Contractor within 3 wks after claim is received by Contractor. Any amounts paid by Owner will be deducted from Contractor's next progress payment.

1.9 OWNER OCCUPANCY

- A. Partial Owner Occupancy: Garages will remain in operation during construction.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing contract modifications.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures" for requirements for Contractor's Construction Schedule.
 - 2. Division 01 Section "Payment Procedures" for administrative procedures governing applications for payment.
 - 3. Division 01 Section "Product Substitution Procedures" for administrative procedures for handling requests for substitutions made after award of Contract.

1.3 MINOR CHANGES IN WORK

- A. Supplemental instructions authorizing minor changes in Work, not involving an adjustment to Contract Sum or Contract Time, will be issued by Engineer/Architect on AIA Form G710, Architect's Supplemental Instructions.

1.4 CHANGE ORDER PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Proposed changes in Work that will require adjustment to Contract Sum or Contract Time will be issued by Engineer/Architect, with detailed description of proposed change and supplemental or revised Drawings and Specifications, if necessary.
 - 1. Proposal requests issued by Engineer/Architect are for information only. Do not consider them instruction either to stop work in progress, or to execute proposed change.
 - 2. Unless otherwise indicated in proposal request, within 20 days of receipt of proposal request, submit to Engineer/Architect for Owner's review an estimate of cost necessary to execute proposed change.

- a. Include list of quantities of products to be purchased and unit costs, along with total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Include the cost rate, anticipated number of hours/days and required tradesman to execute the work.
 - c. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - d. Include statement indicating effect proposed change in Work will have on Contract Time.
- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to Contract, Contractor may propose changes by submitting request for change to Engineer/Architect.
 1. Include statement outlining reasons for change and effect of change on Work. Provide complete description of proposed change. Indicate effect of proposed change on Contract Sum and Contract Time.
 2. Include list of quantities of products to be purchased and unit costs along with total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 3. Include the cost rate, anticipated number of hours/days and required tradesman to execute the work.
 4. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 5. Comply with requirements in Section "Product Substitutions" if proposed change in Work.
 6. Submit request no later than 10 working days after discovery of condition.
- C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When Owner and Contractor are not in total agreement on terms of Change Order Proposal Request, Engineer/Architect may issue Construction Change Directive on AIA Form G714, instructing Contractor to proceed with change in Work, for subsequent inclusion in Change Order.
- B. Construction Change Directive will contain complete description of change in Work and designate method to be followed to determine change in Contract Sum or Contract Time.
- C. Documentation: Maintain detailed records on time and material basis of work required by Construction Change Directive.
 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to Contract.

1.6 CHANGE ORDER PROCEDURES

- A. Upon Owner's approval of Change Order Proposal Request, Engineer/Architect will issue Change Order for signatures of Owner and Contractor on AIA Form G701, as provided in Conditions of Contract.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 012600

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SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with Continuation Sheets.
 - b. Submittals Schedule.
 - 2. Submit the Schedule of Values to Engineer at earliest possible date but no later than **seven (7)** days before the date scheduled for submittal of initial Applications for Payment.

3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
 - a. Project name and location.
 - b. Name of Engineer.
 - c. Engineer's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. Include evidence of insurance or bonded warehousing if required.
 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 7. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Engineer and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Engineer will return incomplete applications without action.
 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit **three (3)** signed and notarized original copies of each Application for Payment to Engineer. One copy shall include waivers of lien and similar attachments if required.
 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
 1. Submit partial waivers on each item for amount requested, before deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.

4. Waiver Delays: Submit each Application for Payment with Contractor's waiver of mechanic's lien for construction period covered by the application.
 - a. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Products list.
 5. Schedule of unit prices.
 6. Submittals Schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
 13. Certificates of insurance and insurance policies.
 14. Performance and payment bonds.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707, "Consent of Surety to Final Payment."
 7. Evidence that claims have been settled.

8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General project coordination procedures.
 - 2. Conservation.
 - 3. Coordination Drawings.
 - 4. Administrative and supervisory personnel.
 - 5. Project meetings.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
 - 2. Division 01 Section "Closeout Procedures" for coordinating Contract closeout.

1.3 COORDINATION

- A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
- B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other

contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Refer to Division 23 Section "Basic Mechanical Materials and Methods" and Division 26 Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.

B. Staff Names: Within **fifteen (15)** days of starting construction operations, submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Engineer of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Engineer, within **three (3)** days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than **fifteen (15)** days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 - 1. Attendees: Authorized representatives of Owner, Engineer, and their consultants; Contractor's Project Manager and superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing.
 - d. Designation of responsible personnel.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for processing Applications for Payment.
 - g. Distribution of the Contract Documents.
 - h. Submittal procedures.
 - i. Preparation of Record Documents.
 - j. Use of the premises.
 - k. Responsibility for temporary facilities and controls.
 - l. Parking availability.
 - m. Office, work, and storage areas.
 - n. Equipment deliveries and priorities.
 - o. First aid.
 - p. Security.
 - q. Progress cleaning.
 - r. Working hours.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Engineer of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Submittals.
 - g. Review of mockups.
 - h. Possible conflicts.
 - i. Compatibility problems.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Required performance results.
 - u. Protection of construction and personnel.
 3. Record significant conference discussions, agreements, and disagreements.
 4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at **bi-weekly** intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner and Engineer, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule.

Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 - 14) Documentation of information for payment requests.
- 3. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

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SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's Construction Schedule.
 - 2. Construction schedule updating reports.
 - 3. Daily construction reports.
 - 4. Field condition reports.
 - 5. Construction photographs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
 - 2. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
 - 3. Division 01 Section "Quality Control" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical activities are activities on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor activity is an activity that precedes another activity in the network.
 - 3. Successor activity is an activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Engineer.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- C. Construction Photographs: Submit an electronic file of each photographic view within **seven (7)** days of taking photographs.
 - 1. Identification: Provide the following information:
 - a. Name of Project.
 - b. Name and address of photographer.
 - c. Name of Engineer.
 - d. Name of Contractor.
 - e. Date photograph was taken.
- D. Daily Construction Reports: Submit **two (2)** copies at **weekly** intervals.
- E. Field Condition Reports: Submit **two (2)** copies at time of discovery of differing conditions.

1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the Startup Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, area separations and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review time required for review of submittals and resubmittals.
 - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 8. Review time required for completion and startup procedures.
 - 9. Review and finalize list of construction activities to be included in schedule.
 - 10. Review submittal requirements and procedures.
 - 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from parties involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.
- C. Auxiliary Services: Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities including temporary lighting.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Procedures: Comply with procedures contained in AGC's "Construction Planning & Scheduling."
- B. Time Frame: Extend schedule from date established for commencement of the Work to date of Final Completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- C. Activities: Treat each separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
 - 1. Activity Duration: Define activities so no activity is longer than **twenty (20)** days, unless specifically allowed by Engineer.
 - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
 - 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.

- D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Startup and placement into final use and operation.
 8. Area Separations: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Permanent space enclosure.
 - c. Completion of mechanical installation.

- d. Completion of electrical installation.
 - e. Substantial Completion.
- E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- F. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.
 - 1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
- G. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- H. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and Contract Time.
- I. Recovery Schedule: When periodic update indicates the Work is **fourteen (14)** or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- J. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's Construction Schedule within **fifteen (15)** days of date established for **the Notice to Proceed**. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. High and low temperatures and general weather conditions.
 5. Accidents.
 6. Meetings and significant decisions.
 7. Unusual events (refer to special reports).
 8. Stoppages, delays, shortages, and losses.
 9. Meter readings and similar recordings.
 10. Emergency procedures.
 11. Orders and requests of authorities having jurisdiction.
 12. Change Orders received and implemented.
 13. Construction Change Directives received.
 14. Services connected and disconnected.
 15. Equipment or system tests and startups.
 16. Partial Completions and occupancies.
 17. Substantial Completions authorized.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit with a request for information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At **monthly** intervals, update schedule to reflect actual construction progress and activities. Issue schedule **one (1) week** before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Actual Completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.2 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified commercial photographer to take construction photographs.
- B. Date Stamp: Unless otherwise indicated, date and time stamp each photograph.
- C. Preconstruction Photographs: Before starting construction, take **four (4)** color photographs of Project site and surrounding properties from different vantage points, as directed by **Engineer**. Show existing conditions adjacent to property.
- D. Periodic Construction Photographs: Take **four (4)** color photographs monthly, coinciding with cutoff date associated with each Application for Payment. Photographer shall select vantage points to best show status of construction and progress since last photographs were taken.
 1. Field Office Prints: Retain one set of prints of periodic photographs in field office at Project site, available at all times for reference. Identify photographs the same as for those submitted to Engineer.
- E. Final Completion Construction Photographs: Take **eight (8)** color photographs after completion of each phase and after date of Substantial Completion for submission as Project Record Documents.

END OF SECTION 013200

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Division 01 Section "Payment Procedures" For submitting Applications for Payment and the schedule of values.
 - 2. Division 01 Section "Project Management and Coordination" for submitting Coordination Drawings.
 - 3. Division 01 Section "Construction Progress Documentation" for submitting periodic construction photographs.
 - 4. Division 01 Section "Quality Control" for submitting test and inspection reports.
 - 5. Division 01 Section "Closeout Procedures" for submitting warranties.
 - 6. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 7. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action.
- B. Informational Submittals: Written and graphic information and physical samples that do not require Engineer's approval. Submittals may be rejected for not complying with requirements.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Engineer's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Engineer's Digital Data Files: Electronic digital data files of the Contract Drawings will **not** be provided by Engineer for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow ten (10) days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
 2. If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Allow ten (10) days for processing each resubmittal.
 4. Concurrent Review: Where concurrent review of submittals by Engineer's consultants, Owner, or other parties is required, allow twenty-one (21) days for initial review of each submittal.
- D. Paper Submittals: Place a permanent label or title block on each submittal for identification.
 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
 3. Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Engineer.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Unique identifier, including revision number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
 4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Engineer.
 - b. Additional copies submitted for maintenance manuals will **not** be marked with action taken and will be returned.
5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Engineer will **discard** submittals received from sources other than Contractor.
 - a. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 - b. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 - c. Transmittal Form: Provide locations on form for the following information:
 - 1) Project name.
 - 2) Date.
 - 3) Destination (To:).
 - 4) Source (From:).
 - 5) Names of subcontractor, manufacturer, and supplier.
 - 6) Category and type of submittal.
 - 7) Submittal purpose and description.
 - 8) Submittal and transmittal distribution record.
 - 9) Remarks.
 - 10) Signature of transmitter.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Engineer.
 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
 - a. Project name.

- b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Submittal and transmittal distribution record.
 - i. Remarks.
 - j. Signature of transmitter.
- 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by Engineer.
- G. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- H. Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner will in turn reimburse Engineer.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Use only final submittals that are marked with approval notation from Engineer's action stamp.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections by either of the following methods.

1. Submit three (3) copies of paper submittals unless otherwise indicated. Engineer will return two (2) copies.
 2. Submit electronic submittals as PDF electronic files. Engineer will return annotated file.
 - a. Submit via email when file size is smaller than 5 megabytes.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified reference standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - i. Mill reports.
 4. For equipment, include the following in addition to the above, as applicable.
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in either of the following formats:
 - a. Three (3) paper copies of each submittal. Engineer will return two (2) copies.
 - b. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Engineers digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

- a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
 3. Submit Shop Drawings in either of the following formats:
 - a. Three (3) paper copies of each submittal. Engineer will return two (2) copies.
 - b. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

- b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one (1) full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
- 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three (3) sets of Samples. Engineer will retain two (2) Sample sets; remainder will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.
- E. Product Schedule: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in either of the following formats:
 - a. Three (3) paper copies of product schedule. Engineer will return two (2) copies.
 - b. PDF electronic file.
- F. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by individual Specification Sections by either of the following methods.
 1. Submit two (2) copies of paper submittals. Engineer will not return copies.
 2. Submit electronic submittals as PDF electronic files. Engineer will not return annotated file.
 - a. Submit via email when file size is smaller than 5 megabytes.
- B. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 1. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 2. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- C. Qualification Data: Prepare and submit written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Engineers and owners, and other information specified.
- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- F. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- G. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- H. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

- I. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- J. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- K. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- L. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- M. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- N. Field Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during product installation or after product installation in its final location, for compliance with requirements in the Contract Documents.
- O. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.

4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Material Safety Data Sheets: When requested, submit information directly to Owner. If submitted to Engineer, Engineer will not review this information but will return it with no action taken.

2.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Engineer.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three (3) paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

2.3 REQUESTS FOR INFORMATION

- A. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
- B. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
- C. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
- B. Project Closeout and Maintenance Material Submittals: See Requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ENGINEER'S ACTION

- A. General: Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Engineer or its subconsultant will review each submittal, make marks to indicate corrections or revisions required, and return it. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. See Section 007300 "Supplementary Conditions" for description of terminology on Engineer's Stamp.
- C. Informational Submittals: Engineer review each submittal and will not return it, or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.

- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- F. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 013300

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SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.
- J.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(888) 293-6498 (202) 512-1530
CRD	Handbook for Concrete and Cement Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	(601) 634-2355
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/	(215) 697-6257
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/	(215) 697-6257

	Available from General Services Administration www.fss.gsa.gov	(202) 501-1021
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/	(215) 697-6257
NES	(Formerly: National Evaluation Service) (See ICC-ES)	
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(202) 862-5100
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council	(202) 737-0202

www.aabchq.com

AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists (The) www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association (Now part of CPA)	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400

AIISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
ALCA	Associated Landscape Contractors of America www.alca.org	(800) 395-2522 (703) 736-9666
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts www.aosaseed.com	(505) 522-1437
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers Interna- tional) www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040

ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWCI	AWCI International (Association of the Wall and Ceiling Industries International) www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (Now WCSC)	
AWI	Architectural Woodwork Institute www.awinet.org	(800) 449-8811 (703) 733-0600
AWPA	American Wood-Preservers' Association www.awpa.com	(344) 874-9800
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	BICSI www.bicsi.org	(813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(773) 761-4100
	Cast Stone Institute www.caststone.org	(770) 972-3011
CCC	Carpet Cushion Council www.carpetcushion.org	(203) 637-1312
CDA	Copper Development Association Inc. www.copper.org	(800) 232-3282 (212) 251-7200

CEA	Canadian Electricity Association www.canelect.ca/connections_online/home.htm	(613) 230-9263
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CGSB	Canadian General Standards Board www.pwgsc.gc.ca/cgsb	(800) 665-2472 (819) 956-0425
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(800) 463-6727 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087

DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee www.asce.org	(800) 548-2723 (703) 295-6300
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association www.esda.org	(315) 339-6937
FCI	Fluid Controls Institute www.fluidcontrolsintitute.org	(216) 241-7333
FIBA	Federation Internationale de Basketball Amateur (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM	Factory Mutual System (Now FMG)	
FMG	FM Global (Formerly: FM - Factory Mutual System) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridarooft.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	52 951 5146905
GA	Gypsum Association www.gypsum.org	(202) 289-5440

GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Now GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (Now CSA International)	
IBF	International Badminton Federation www.intbadfed.org	441-24 223-4904
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IGCC	Insulating Glass Certification Council	(315) 646-2234

	www.igcc.org	
IGMA	Insulating Glass Manufacturers Alliance (The) www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(702) 567-8150
ITS	Intertek Testing Services www.intertek.com	(800) 345-3851 (607) 753-6711
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937

MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, Ext. 453
NAIMA	North American Insulation Manufacturers Association (The) www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association	(303) 697-8441

	www.netaworld.org	
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo and Mosaic Association, Inc. www.ntma.com	(800) 323-9736 (540) 751-0930
NTRMA	National Tile Roofing Manufacturers Association (Now TR)	
NWWDA	National Wood Window and Door Association (Now WDMA)	
OPL	Omega Point Laboratories, Inc. www.opl.com	(800) 966-5253 (210) 635-8100
PCI	Precast/Prestressed Concrete Institute	(312) 786-0300

www.pci.org

PDCA	Painting and Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
PTI	Post-Tensioning Institute www.post-tensioning.org	(602) 870-7540
RCSC	Research Council on Structural Connections www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
RTI	(Formerly: NTRMA – National Tile Roofing Manufacturers Association) (Now TRI)	
SAE	SAE International www.sae.org	(724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 462-1930
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(516) 294-5424
SEI	Structural Engineering Institute www.seinstitute.com	(800) 548-2723 (703) 295-6195
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	

SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPI/SPFD	Society of the Plastics Industry, Inc. (The) Spray Polyurethane Foam Division (Now SPFA)	
SPRI	SPRI (Single Ply Roofing Institute) www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, and Restoration Institute www.swrionline.org	(816) 472-7974
TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic	(703) 907-7700

	Industries Alliance www.tiaonline.org	
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(608) 833-5900
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 705-9898
TRI	Tile Roofing Institute (Formerly: RTI – Roof Tile Institute) www.tilerroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(800) 285-4476 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(202) 828-7422
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Now WCSC)	
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 661-4261
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200

WI	Woodwork Institute (Formerly: WIC –Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WIC	Woodwork Institute of California (Now WI)	
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 548-0112
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. (See ICC)	
CABO	Council of American Building Officials (See ICC)	
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICBO	International Conference of Building Officials (See ICC)	
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	
ICC	International Code Council (Formerly: CABO - Council of American Building Officials) www.iccsafe.org	(703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
NES	National Evaluation Service (See ICC-ES)	
SBCCI	Southern Building Code Congress International, Inc.	

(See ICC)

- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-6816
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense www.dodssp.daps.mil	(215) 697-6257
DOE	Department of Energy www.eren.doe.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(202) 366-4000
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111 (202) 501-1888
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478

OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Building Service (See GSA)	
PHS	Office of Public Health and Science http://phs.os.dhhs.gov	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board www.nas.edu/trb	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791
USPS	Postal Service www.usps.com	(202) 268-2000

- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Products Laboratory http://txforestservice.tamu.edu	(936) 639-8180

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 014200

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SECTION 014210 - REFERENCE STANDARDS AND DEFINITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

- A. General: Basic contract definitions are included in the Conditions of the Contract.
- B. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.
- C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the Design Professional, requested by the Design Professional, and similar phrases.
- D. "Approved": The term "approved," when used in conjunction with the Design Professional's action on the Contractor's submittals, applications, and requests, is limited to the Design Professional's duties and responsibilities as stated in the Conditions of the Contract.
- E. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": The term "install" describes operations at the Project site including the actual unloading, temporary storage, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.
- I. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a

particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
 2. Trades: Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
 3. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
 - a. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.
- J. "Project site" is the space available to the Contractor for performing construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- K. "Testing Agencies": A testing agency is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

- A. Specification Format: These Specifications are organized into Divisions and Sections based on the 16-Division format and CSI/CSC's "MasterFormat" numbering system.
- B. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words shall be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Section Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of the date of the Contract Documents.
- C. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to the Design Professional for a decision before proceeding.
 1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the Design Professional for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on the Project must be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 1. Where copies of standards are needed to perform a required construction activity, the Contractor shall obtain copies directly from the publication source and make them available on request.
- E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-producing organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research's "Encyclopedia of Associations" or Columbia Books' "National Trade & Professional Associations of the U.S.," which are available in most libraries.

1.5 SUBMITTALS

- A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 014210

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SECTION 014500 - QUALITY CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Quality control services include inspections, tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by Engineer/Architect.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
 - 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
 - 2. Inspections, tests and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for the Contractor to provide quality control services required by Engineer/Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- E. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Cutting and Patching" specifies requirements for repair and restoration of construction disturbed by inspection and testing activities.
 - 2. Division 01 Section "Submittal Procedures" specifies requirements for development of a schedule of required tests and inspections.

1.3 RESPONSIBILITIES

A. Contractor Responsibilities:

1. Retesting: Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
 - a. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
2. Associated Services: Cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
 - a. Provide access to the Work.
 - b. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
 - c. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
 - d. Provide facilities for storage and curing of test samples.
 - e. Deliver samples to testing laboratories.
 - f. Provide the agency with a preliminary design mix proposed for use for material mixes that require control by the testing agency.
 - g. Provide security and protection of samples and test equipment at the Project Site.

B. Owner Responsibilities: Owner will provide inspections, tests and similar quality control services specified to be performed by independent agencies and not by the Contractor, except where they are specifically indicated as the Contractor's responsibility or are provided by another identified entity. Costs for these services are not included in the Contract Sum.

1. Owner will employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform services which are the Owner's responsibility.

C. Coordination: Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition Contractor and each agency shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.

1.4 SUBMITTALS

- A. Testing Agency shall submit a certified written report of each inspection, test or similar service, to Engineer/Architect, in duplicate, unless Contractor is responsible for the service. If Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.
 - 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
 - 2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making the inspection or test.
 - f. Designation of the Work and test method.
 - g. Identification of product and Specification Section.
 - h. Complete inspection or test data.
 - i. Test results and interpretations of test results.
 - j. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
 - k. Name and signature of laboratory inspector.
 - l. Recommendations on retesting.

1.5 QUALITY ASSURANCE

- A. Qualification for Testing Agencies: Engage testing agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.
 - 1. Each independent testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

PART 2 - PRODUCTS (NOT APPLICABLE).

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

- B. Protect construction exposed by or for quality control service activities, and protect repaired construction.
- C. Repair and protection is the Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

END OF SECTION 014500

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes minimum requirements for construction facilities and temporary controls, including temporary utilities, support facilities, and security and protection. The Contractor retains all responsibility for the adequacy and sufficiency of all jobsite safety precautions and programs.
- B. Temporary utilities required include but are not limited to the following:
 - 1. Telephone service.
 - 2. Temporary heat.
 - 3. Ventilation.
 - 4. Sanitary facilities, including drinking water.
- C. Support facilities include, but are not limited to, the following:
 - 1. Field offices and storage sheds.
 - 2. Temporary enclosures.
 - 3. Hoists and temporary elevator use.
 - 4. Temporary Project identification signs and bulletin boards.
 - 5. Waste disposal services.
 - 6. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
 - 1. Temporary fire protection.
 - 2. Barricades, warning signs, lights.
 - 3. Sidewalk bridge or enclosure fence for the site.
 - 4. Environmental protection.
 - 5. Temporary protection and support of permanent active utilities within the work area.
 - 6. Temporary protection and support of architectural, mechanical, electrical and other non-structural items and systems within or near the work area such as, but not limited to entrance ways, doors, elevators, escalators, machine rooms, electrical rooms, ventilation systems, revenue and access control systems, fire protection sprinkler systems, and lighting systems.

1.3 SUBMITTALS

- A. Temporary Utilities: Submit reports of tests, inspections, meter readings, permits, correspondence with governing utility agencies and similar procedures performed on temporary utilities.
- B. Implementation and Termination Schedule: Submit schedule indicating implementation and termination of each temporary utility within 15 days of date established for commencement of Work.

1.4 QUALITY ASSURANCE

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to, the following:
 - 1. Building Code requirements.
 - 2. Health and safety regulations.
 - 3. Utility company regulations.
 - 4. Police, Fire Department and Rescue Squad rules.
 - 5. Environmental protection regulations.
- B. Standards: Comply with NFPA Code 241, "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
 - 1. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70, "National Electric Code."
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Utilities: Prepare schedule indicating dates for implementation and termination of each temporary utility.
- B. Temporary connection to existing utilities: When acceptable to Owner, Contractor may connect into existing utilities within the work area.
 - 1. Confirm the existing utility has sufficient capacity to supply the temporary needs for construction activities. Owner does not guarantee unlimited supply.
 - 2. Confirm the temporary utility connection does not reduce the utility supply to below the capacity needed by active permanent systems attached to the service. Remove temporary connections found to affect permanent service at no cost to the Owner.

3. For purposes of bidding, Contractor shall assume that electrical and water service is available but Contractor must verify capacities.
 4. All temporary connection installation, maintenance, protection, removal and associated costs shall be responsibility of Contractor and shall not be chargeable to Owner or Engineer/Architect.
 5. At each temporary connection provide following:
 - a. Operable utility shutoff device: Device shall be commercially available device such as valve or switch. Shutoff device shall not require removal of a portion of utility line or specialized skill to operate. Device shall be designed to fail in a safe manner and be clearly identified as to its purpose. Location of shutoff device shall be accessible to workers without requiring access to restricted areas.
 - b. Metering device: Device shall be commercially available, calibrated device to measure amount of utility consumed by contractor. Provided certificate showing device has been calibrated within the last three months. If no metering device is required, provide area and fixtures to permit installation of device at later date at not additional cost to Owner.
 - c. Owner will charge Contractor direct cost of utilities with no markup.
- C. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in safe and efficient manner. Relocate temporary services and facilities as Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide new materials; if acceptable to Engineer/Architect, undamaged previously used materials in serviceable condition may be used. Provide materials suitable for use intended.
- B. Lumber and Plywood: All wood used for safety or separation barriers between the public and the work area shall be UL labeled, fire treated.
 1. For job-built temporary offices, shops and sheds within construction area, provide UL labeled, fire treated lumber and plywood for framing, sheathing and siding.
 2. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1, of sizes and thickness indicated.
 3. For fences and vision barriers, provide exterior type, minimum 0.375 in. thick plywood.
 4. For safety barriers, sidewalk bridges and similar uses, provide minimum 0.625 in. thick exterior plywood.

- C. Gypsum Wallboard: Provide gypsum wallboard complying with requirements of ASTM C 36 on interior walls of temporary offices.
- D. Roofing Materials: Provide UL Class "A" standard weight asphalt shingles complying with ASTM D 3018, or UL Class "C" mineral surfaced roll roofing complying with ASTM D 249 on roofs of job-built temporary offices, shops and sheds.
- E. Paint: Comply with requirements of Division 09 Section "Exterior Painting."
 - 1. For job-built temporary offices, shops, sheds, fences and other exposed lumber and plywood, provide exterior grade acrylic-latex emulsion over exterior primer.
 - 2. For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.
 - 3. For interior walls of temporary offices, provide two coats interior latex flat wall paint.
- F. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.
- G. Water: Provide potable water approved by local health authorities.

2.2 EQUIPMENT

- A. General: Provide new equipment; if acceptable to Engineer/Architect, undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 0.75 in. heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than maximum pressure of water distribution system; provide adjustable shut-off nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- D. Electrical power cords: provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

- G. Temporary Offices: Owner can provide temporary office space for the duration of the project.
- H. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- I. First Aid Supplies: Comply with governing regulations.
- J. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
 - 1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.
- K. Temporary Fuel Tanks: Comply with all applicable safety and environmental regulations for temporary surface fuel tanks. Location and installation shall be subject to review and approval of Engineer/Architect and Fire Marshall.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.
- C. All temporary facilities shall be located within work area.
- D. Installation of temporary facilities shall not block pedestrian and vehicular traffic to adjacent non-work areas.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
 - 1. Arrange with company and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
 3. Obtain easements to bring temporary utilities to site where Owner's easements cannot be used for that purpose.
 4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Engineer/Architect. Neither Owner nor Engineer/Architect will accept cost or use charges as basis of claims for Change Orders.
- B. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.
- C. Temporary Lighting: When existing lighting is insufficient or out of service provide temporary lighting with local switching.
1. Install and operate temporary lighting that will fulfill security and protection requirements without operating entire system. Provide temporary lighting that will fulfill security and protection requirement without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
- D. Temporary Heat: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- E. Heating Facilities: Provide vented, self-contained, LP-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.
- F. Telephones: Contractors supervisory personnel shall have mobile telephones.
- G. Sanitary facilities include temporary toilets, wash facilities, and drinking-water fixtures. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
- H. Toilets: Use of the Owner's existing toilet facilities will be permitted, so long as:
1. Facilities and access routes to facilities are cleaned and maintained in a condition acceptable to Owner.

2. Contractor personnel do not cause, in Owner's opinion, a significant disturbance to Owner's staff during use of facilities.
 3. At substantial completion, or upon notice by Owner that Contractor personnel are no longer permitted to use restrooms, restore facilities and access routes to condition existing at time of initial use.
- I. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
1. Provide separate facilities for male and female personnel.
- J. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.
1. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
- K. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access.
1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 ft of building lines. Comply with requirements of NFPA 241.
- C. Field Offices: Owner can provide space for a field office.
- D. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on site.
- E. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
1. Where heat is needed and permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat.

- Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
 - 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq ft or less with plywood or similar materials.
 - 3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
 - 4. Do not block access to emergency exits from the facility during installation of temporary enclosures unless approved by authorities having jurisdiction.
 - 5. Where temporary wood or plywood enclosure exceeds 100 sq ft in area, use UL-labeled fire-retardant treated material for framing and main sheathing.
- F. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- G. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.
- 1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.
 - 2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.
- H. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when temperature is expected to rise above 80° F. (27° C.). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in lawful manner.
- I. Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or as directed by Owner.
- B. Temporary Fire Protection: Provide and maintain temporary fire protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 2. Store combustible materials in containers in fire-safe locations.
 3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
 4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
- D. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and public of hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- E. Enclosure Fence: When excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose entire site or portion determined sufficient to accommodate construction operations. Install in manner that will prevent people, dogs and other animals from easily entering site, except by entrance gates.
1. Provide open-mesh, chain-link fencing with posts set in compacted mixture of gravel and earth.
 2. Provide plywood fence, 8 ft high, framed with four 2 in. x 4 in. rails, and preservative treated wood posts spaced not more than 8 ft apart.
- F. Covered Walkway: Erect structurally adequate, protective covered walkway for passage of persons along adjacent public street. Coordinate with entrance gates, other facilities and obstructions. Comply with regulations of authorities having jurisdiction.
1. Construct covered walkways using scaffold or shoring framing. Provide wood plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well- drained walkways and similar provisions for protection and safe passage. Extend the back wall beyond structure to complete enclosure fence. Paint and maintain in manner acceptable to Owner and Engineer/Architect.
- G. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide secure lockup. Enforce discipline in connection with the installation and release of material to minimize opportunity for theft and vandalism.

- H. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near site.

3.5 OPERATION, TERMINATION AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on 24-hr day basis where required to achieve indicated results and to avoid possibility of damage.
 - 2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless Engineer/Architect requests that it be maintained longer, remove each temporary facility when need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances which might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by governing authority.
 - 3. At Substantial Completion, clean and renovate permanent facilities that have been used during construction period, including but not limited to:
 - a. Replace air filters and clean inside of ductwork and housings.
 - b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
 - c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements governing Contractor's selection of products for use in Project.
 - 1. Multiple Prime Contracts: Provisions of this Section apply to construction activities of each prime Contractor.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Reference Standards and Definitions" specifies the applicability of industry standards to products specified.
 - 2. Division 01 Section "Submittal Procedures" specifies requirements for submittal of the Contractor's Construction Schedule and the Submittal Schedule.
 - 3. Division 01 Section "Product Substitution Procedures" specifies administrative procedures for handling requests for substitutions made after award of the Contract.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change meaning of other terms used in Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms such are self-explanatory and have well recognized meanings in construction industry.
 - 1. **"Products"** are items purchased for incorporation in Work, whether purchased for Project or taken from previously purchased stock. Term "product" includes terms "material," "equipment," "system," and terms of similar intent.
 - a. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature that is current as of date of Contract Documents.
 - b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50% or more of value) outside of United States and its possessions; or produced or supplied by entities substantially

owned (more than 50%) by persons who are not citizens of nor living within United States and its possessions.

2. **"Materials"** are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form part of Work.
3. **"Equipment"** is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.4 SUBMITTALS

- A. Product List: Prepare list showing products specified in tabular form acceptable to Engineer/Architect. Include generic names of products required. Include manufacturer's name and proprietary product names for each item listed.
 1. Coordinate product list with Contractor's Construction Schedule and Schedule of Submittals.
 2. Form: Prepare product list with information on each item tabulated under following column headings:
 - a. Related Specification Section number.
 - b. Generic name used in Contract Documents.
 - c. Proprietary name, model number and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date, or time span of delivery period.
 3. Initial Submittal: Within 30 days after date of commencement of Work, submit 3 copies of an initial product list. Provide written explanation for omissions of data and for known variations from Contract requirements.
 - a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 4. Completed List: Within 60 days after date of commencement of Work, submit 3 copies of completed product list. Provide written explanation for omissions of data and for known variations from Contract requirements.
 5. Engineer/Architect's Action: Engineer/Architect will respond in writing to Contractor within 2 wks of receipt of completed product list. No response within this period constitutes no objection to listed manufacturers or products but does not constitute a waiver of the requirement that products comply with Contract Documents. Engineer/Architect's response will include a list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.5 QUALITY ASSURANCE

- A. Source Limitations: To fullest extent possible, provide products of same kind, from single source.
 - 1. When specified products are available only from sources that do not or cannot produce quantity adequate to complete project requirements in timely manner, consult with Engineer/Architect for determination of most important product qualities before proceeding. Qualities may include attributes relating to visual appearance, strength, durability, or compatibility. When determination has been made, select products from sources that produce products that possess these qualities, to fullest extent possible.
- B. Compatibility of Options: When Contractor is given option of selecting between 2 or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
 - 1. Each prime Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of other prime or separate Contractors.
 - 2. If dispute arises between prime Contractors over concurrently selectable, but incompatible products, Engineer/Architect will determine which products shall be retained and which are incompatible and must be replaced.
- C. Foreign Product Limitations: Except under 1 or more of following conditions, provide domestic products, not foreign products, for inclusion in the Work:
 - 1. No available domestic product complies with Contract Documents.
 - 2. Domestic products that comply with Contract Document are only available at prices or terms that are substantially higher than foreign products that also comply with Contract Documents.
- D. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on exterior.
- E. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.
- F. Equipment Nameplates: Provide permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. Nameplate shall contain following information and other essential operating data:
 - 1. Name of product and manufacturer.
 - 2. Model and serial number.
 - 3. Capacity.
 - 4. Speed.
 - 5. Ratings.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store and handle products according to manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
 - 1. Schedule delivery to minimize long-term storage at site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
 - 3. Deliver products to site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
 - 4. Inspect products upon delivery to ensure compliance with Contract Documents, and to ensure that products are undamaged and properly protected.
 - 5. Store products at site in manner that will facilitate inspection and measurement of quantity or counting of units.
 - 6. Store heavy materials away from Project structure in manner that will not endanger supporting construction.
 - 7. Store products subject to damage by elements above ground, under cover in weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
- B. Off-site storage: If Contractor intends to request payment for bulky items such as precast concrete pieces that are manufactured specifically for Project, but stored off-site, submit procedures for identifying and safeguarding these items, as well as payment request procedures, to Owner for its review prior to manufacture or purchase.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

- A. General Product Requirements: Provide products that comply with Contract Documents, that are undamaged and, unless otherwise indicated, new at time of installation.
 - 1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for complete installation and for intended use and effect.
 - 2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
- B. Product Selection Procedures: Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include following:

1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide product indicated. No substitutions will be permitted.
2. Semiproprietary Specification Requirements: Where 2 or more products or manufacturers are named, provide 1 of products indicated. No substitutions will be permitted.
 - a. Where products or manufacturers are specified by name, accompanied by term "or equal," or "or approved equal" comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
3. Compliance with Standards, Codes and Regulations: Where Specifications only require compliance with an imposed code, standard or regulation, select product that complies with standards, codes or regulations specified.
4. Visual Matching: Where Specifications require matching an established Sample, Engineer/Architect's decision will be final on whether proposed product matches satisfactorily.
 - a. Where no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of Contract Documents concerning "substitutions" for selection of matching product in another product category.
5. Visual Selection: Where specified product requirements include phrase "...as selected from manufacturer's standard colors, patterns, textures..." or similar phrase, select product and manufacturer that complies with other specified requirements. Engineer/Architect will select color, pattern and texture from product line selected.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:

- A. Comply with manufacturer's instructions and recommendations for installation of products in applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.
 1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 016000

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SECTION 016010 - PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after award of Contract.
- B. Contractor's Construction Schedule and Schedule of Submittals are included under Section "Submittal Procedures."
- C. Standards: Refer to Section "Reference Standards and Definitions" for applicability of industry standards to products specified.
- D. Procedural requirements governing Contractor's selection of products and product options are included under Section "Product Requirements."
- E. Engineer/Architect's policy is to reject requests for substitution unless paragraph "Substitutions" under Article "Definitions" applies. Vendors wishing inclusion in Engineer/Architect's master specification: contact Engineer for procedure.

1.3 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify meaning of other terms used in Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by Contractor after award of Contract are considered requests for "substitutions." Following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by Owner or Engineer/Architect.
 - 2. Specified options of products and construction methods included in Contract Documents.
 - 3. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.4 SUBMITTALS

- A. Substitution Request Submittal: Requests for substitution will be considered if received within 30 days after commencement of Work. Requests received more than 30 days after commencement of Work may be considered or rejected at discretion of Engineer/Architect.
1. Submit 3 copies of each request for substitution for consideration. Submit requests on forms included at end of this Section and in accordance with procedures required for Change Order proposals.
 2. Identify product, or fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with requirements for substitutions, and the following information, as appropriate:
 - a. Product Data, including Drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.
 - c. Detailed comparison of significant qualities of proposed substitution with those of Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including list of changes or modifications needed to other parts of Work and to construction performed by Owner and separate Contractors that will become necessary to accommodate proposed substitution.
 - e. Statement indicating substitution's effect on Contractor's Construction Schedule compared to schedule without approval of substitution. Indicate effect of proposed substitution on overall Contract Time.
 - f. Cost information, including proposal of net change, if any in Contract Sum.
 - g. Certification by Contractor that substitution proposed is equal-to or better in every significant respect to that required by Contract Documents, and that it will perform adequately in application indicated. Include Contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of failure of substitution to perform adequately.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Conditions: Contractor's substitution request will be received and considered by Engineer/Architect when one or more of following conditions are satisfied, as determined by Engineer/Architect; otherwise requests will be returned without action except to record noncompliance with these requirements.
1. Extensive revisions to Contract Documents are not required.
 2. Proposed changes are in keeping with general intent of Contract Documents.
 3. Request is timely, fully documented and properly submitted.
 4. Request is directly related to an "or equal" clause or similar language in Contract Documents.

5. Specified product or method of construction cannot be provided within Contract Time. Request will not be considered if product or method cannot be provided as result of failure to pursue Work promptly or coordinate activities properly.
 6. Specified product or method of construction cannot receive necessary approval by governing authority, and requested substitution can be approved.
 7. Substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities Owner may be required to bear. Additional responsibilities for Owner may include additional compensation to Engineer/Architect for redesign and evaluation services, increased cost of other construction by Owner or separate Contractors, and similar considerations.
 8. Specified product or method of construction cannot be provided in manner that is compatible with other materials, and where Contractor certifies that substitution will overcome incompatibility.
 9. Specified product or method of construction cannot be coordinated with other materials, and where Contractor certifies that proposed substitution can be coordinated.
 10. Specified product or method of construction cannot provide warranty required by Contract Documents and where Contractor certifies that proposed substitution provide required warranty.
- B. Contractor's submittal and Engineer/Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 016010

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REQUEST FOR SUBSTITUTION

To:

Attention:

From:

Name of Company

Address

City, State, Zip Code

Phone

Fully answer all information requested below. Failure to answer any item may cause rejection of request for substitution. If requested by Engineer/Architect, submit information about manufacturer and vendor history, financial stability, distribution and support systems. Use one form for each product requested. Only first product listed will be considered on forms with more than one product listed.

Specification Section Number: _____ Drawing Number: _____

Para Number: _____ Detail Number: _____

Specified Product: _____

Proposed Substitution: _____

Answer the following questions. Attach an explanation sheet on your company's letterhead when required.

Does the proposed substitution affect dimensions indicated on Drawings?

No _____ Yes _____ (If yes, explain below).

Does the proposed substitution require changes in Drawings and/or design or installation changes?

No _____ Yes _____

If yes, is the cost of these changes included in the proposed amount? No _____ Yes _____

Does the proposed substitution affect other trades? No _____ Yes _____

(If yes, explain who and how)

If the proposed product does affect the work of other trades, has the cost impact on their work been included in the price of the proposed substitution?

No _____ Yes _____

Does the proposed product's guarantee differ from that of the specified product's?

No _____ Yes _____ (If yes, explain below).

Why is this proposal for substitution being submitted? List reasons below.

Attach a listing of 3 projects using proposed substitution completed within the past 5 yrs in geographic and climatic region of Project. One of applications shall have been in service for at least 3 yrs.

Attach product data/brochures and Vendor Qualification Form for the specified and substitute product.

Undersigned has examined Construction Documents, is familiar with specified product, understands indicated application of product, and understands design intent of Engineer/Architect. Undersigned states that proposed substitution complies with Construction Documents and will perform at least equally to specified product within limitations stated above. Undersigned accepts responsibility for coordinating application and installation of proposed substitution and waives all claims for additional costs resulting from incorporation of proposed substitution into Project or its subsequent failure to perform according to specified requirements.

Submitted By: _____
Typed Signature

Date: _____

**Vendor Qualification Form
Walker Parking Consultants/Engineers, Inc.**

1. Statement of Confidentiality:

Walker Parking Consultants/Engineers, Inc. (WPC) will treat any information as confidential which is clearly labeled so. A "clear label" is defined as the word "Confidential" marked in red ink on each and every page desired confidential in letters no less than one half inch high. At most, only two WPC staff will have access to vendor information marked "Confidential", Randy Carwile and his designate.

2. Statement of WPC's Commitment to Quality:

WPC is committed to providing quality service to its clients. As part of this commitment, WPC never makes a promise it cannot keep. WPC requires the same commitment from its vendors, whether direct or indirect.

3. Statement of WPC's Relationship to its Vendors:

Mutual trust is the relationship WPC desires with all its vendors. Both WPC and its vendors must realize that trust must be earned over time. Trust is easily damaged and sometimes impossible to recover.

4. Vendor's Organization:

For the product being considered, list the number of employees in:

_____	Product manufacture
_____	Product sales
_____	Product marketing
_____	Product R & D
_____	Product technical service
=====	TOTAL

5. Financial Stability:

Provide past 5 yrs sales history and current audited financial statement or equivalent documentation of financial stability.

6. Safety and Environment:

Define vendor policies.

7. Sales/Service Offices:

List all locations.

8. Geographic Markets:

List all areas served.

9. Products:

On (a) separate sheet(s) for each product, list product name, uses, length of time in service, test data. Provide Material Safety Data Sheet(s). Provide case history data of product use in 5 major projects within the last 2 yrs.

10. Quality Assurance:

Define manufacturing program. Define installation program.

11. Installation:

By manufacturer?	_____ Y	_____ N
By certified applicators?	_____ Y	_____ N
By approved applicators?	_____ Y	_____ N
By any applicator?	_____ Y	_____ N

12. Comments:

13. Standard Warranty:

Provide copy of terms.

14. References:

Provide three. _____

Signature: _____

Printed name: _____

Title: _____

Date: _____

Have this statement notarized.

Decision of Engineer/Architect regarding acceptance or rejection of proposed substitution will be based, at least in part, on information supplied above and in attached explanations and product data.

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. General installation of products.
 - 3. Progress cleaning.
 - 4. Starting and adjusting.
 - 5. Protection of installed construction.
 - 6. Correction of the Work.
 - 7. Construction Phasing.
 - 8. Maintaining public access through or adjacent to the Work.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
 - 2. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
 - 3. Division 02 Section "Work Items" for coordinating restoration construction activities to maintain Owner's operations during construction.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework or demolition, investigate and verify the existence and location of underground or embedded utilities and other construction affecting the Work.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 1. Notify Engineer and Owner not less than two (2) days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Owner's written permission.
- C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Engineer. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 8 feet (2.4 m) in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
 - 2. Allow for building movement, including thermal expansion and contraction.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.4 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
 - 1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.
- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.5 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Control."

3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.7 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

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SECTION 017329 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Divisions 02 through 14, 21-27, and 31-33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 23 and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.

4. Dates: Indicate when cutting and patching will be performed.
5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
7. Engineer's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 1. Water, moisture, or vapor barriers.
 2. Membranes and flashings.
 3. Exterior curtain-wall construction.
 4. Equipment supports.
 5. Piping, ductwork, vessels, and equipment.
 6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
 1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.
 - a. Processed concrete finishes.
 - b. Stonework and stone masonry.
 - c. Ornamental metal.
 - d. Matched-veneer woodwork.
 - e. Preformed metal panels.
 - f. Roofing.
 - g. Firestopping.

- h. Window wall system.
 - i. Stucco and ornamental plaster.
 - j. Terrazzo.
 - k. Finished wood flooring.
 - l. Fluid-applied flooring.
 - m. Aggregate wall coating.
 - n. Wall covering.
 - o. HVAC enclosures, cabinets, or covers.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 02 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

END OF SECTION 017329

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SECTION 017423 - FINAL CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for final cleaning at Substantial Completion.
 - 1. Special cleaning requirements for specific elements of Work are included in appropriate Sections of Divisions 02 through 14, 21-27, and 31-33.
- B. General Project closeout requirements are included in Section "Closeout Procedures."
- C. General cleanup and waste removal requirements are included in Section "Temporary Facilities and Controls."
- D. Environmental Requirements: Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.
 - 1. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
 - 2. Burning or burying of debris, rubbish or other waste material on the premises will not be permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
- B. Complete following cleaning operations before requesting inspection for Certification of Substantial Completion for entire Project or a portion of Project.
 - 1. Clean Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste materials, litter and foreign substances. Sweep paved areas broom clean. Remove petro-chemical spills, stains and other foreign deposits. Rake grounds that are neither planted nor paved, to a smooth even-textured surface.
 - 2. Remove tools, construction equipment, machinery and surplus material from the site.
 - 3. Remove snow and ice to provide safe access to the building.
 - 4. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - 5. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - 6. Broom clean concrete floors in unoccupied spaces.
 - 7. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo if required.
 - 8. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - 9. Remove labels that are not permanent labels.
 - 10. Touch-up and otherwise repair and restore marred exposed finishes and surfaces. Replace finishes and surfaces that can not be satisfactorily repaired or restored, or that show evidence of repair or restoration. Do not paint over "UL" and similar labels, including mechanical and electrical name plates.
 - 11. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
 - 12. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - 13. Replace air disposable filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills. Clean ducts, blowers, and coils if units were operated without filters during construction.
 - 14. Clean light fixtures, lamps, globes and reflectors to function with full efficiency. Replace burned out bulbs, and defective and noisy starters in fluorescent and mercury vapor fixtures.
 - 15. Leave Project clean and ready for occupancy.

- C. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during remainder of construction period.
- D. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of in a lawful manner.
 - 1. Where extra materials of value remain after completion of associated construction have become Owner's property, dispose of these materials as directed.

END OF SECTION 017423

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SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
 - 1. Inspection procedures.
 - 2. Submittal of warranties.
 - 3. Final cleaning.
- B. Closeout requirements for specific construction activities are included in appropriate Sections in Divisions 02 through 14, 21-27, and 31-33.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete following. List exceptions in request.
 - 1. In Application for Payment that coincides with, or first follows, date Substantial Completion is claimed, show 100% completion for portion of Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and statement showing an accounting of changes to Contract Sum.
 - a. If 100% completion cannot be shown, include list of incomplete items, value of incomplete construction, and reasons Work is not complete.
 - 2. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
 - 3. Obtain and submit releases enabling Owner unrestricted use of Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.
 - 4. Submit record drawings, maintenance manuals, final project photographs, damage or and similar final record information.
 - 5. Deliver tools, spare parts, extra stock, and similar items.
 - 6. Make final change-over of permanent locks and transmit keys to Owner. Advise Owner's personnel of change-over in security provisions.

7. Complete start-up testing of systems, and instruction of Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from site, along with construction tools, mock-ups, and similar elements.
 8. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.
- B. Inspection Procedures: On receipt of request for inspection, Engineer/Architect will either proceed with inspection or advise Contractor of unfilled requirements. Engineer/Architect will prepare Certificate of Substantial Completion following inspection, or advise Contractor of construction that must be completed or corrected before certificate will be issued.
1. Engineer/Architect will repeat inspection when requested and assured that Work has been substantially completed.
 2. Engineer/Architect will provide one repeat inspection under its contract with Owner. Subsequent inspections shall be at Contractor's expense.
 3. Results of completed inspection will form basis of requirements for final acceptance.

1.4 FINAL ACCEPTANCE

- A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in request.
1. Submit final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
 2. Submit an updated final statement, accounting for final additional changes to Contract Sum.
 3. Submit certified copy of Engineer/Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and list has been endorsed and dated by Engineer/Architect.
 4. Submit final meter readings for utilities, measured record of stored fuel, and similar data as of date of Substantial Completion, or when Owner took possession of and responsibility for corresponding elements of Work.
 5. Submit consent of surety to final payment.
 6. Submit final liquidated damages settlement statement.
 7. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Reinspection Procedure: Engineer/Architect will reinspect Work upon receipt of notice that Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to Engineer/Architect.
1. Engineer/Architect will provide one repeat inspection under its contract with Owner. Subsequent inspections shall be at Contractor's expense.

2. Upon completion of reinspection, Engineer/Architect will prepare certificate of final acceptance, or advise Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
3. If necessary, reinspection will be repeated.

PART 2 - PRODUCTS (NOT APPLICABLE).

PART 3 - EXECUTION

3.1 CLOSEOUT PROCEDURES

- A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include detailed review of following items:
 1. Maintenance manuals.
 2. Record documents, including all final surveys.
 3. Spare parts and materials.
 4. Tools.
 5. Lubricants.
 6. Fuels.
 7. Identification systems.
 8. Control sequences.
 9. Hazards.
 10. Cleaning.
 11. Warranties and bonds.
 12. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate following procedures:
 1. Start-up.
 2. Shutdown.
 3. Emergency operations.
 4. Noise and vibration adjustments.
 5. Safety procedures.
 6. Economy and efficiency adjustments.
 7. Effective energy utilization.

END OF SECTION 017700

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SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Maintenance manuals for the care and maintenance of products, materials, systems and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
 - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 02 through 14, 21-27, and 31-33 Sections for specific operation and maintenance manual requirements for products in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Initial Submittal: Submit two (2) draft copies of each manual at least fifteen (15) days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Owner or entity designated by Owner will return one (1) copy of draft and mark whether general scope and content of manual are acceptable.

- B. Final Submittal: Submit one (1) of each manual in final form at least fifteen (15) days before final inspection. Owner or entity designated by Owner will return copy with comments within fifteen (15) days after final inspection.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with the same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.

- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name, address, and telephone number of Contractor.
 6. Name and address of Engineer/Architect.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch, 20-lb/sq. ft. white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

- a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
- b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 1. System, subsystem, and equipment descriptions.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.

5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.

B. Descriptions: Include the following:

1. Product name and model number.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.

2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in the manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard printed maintenance instructions and bulletins.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for the schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

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SECTION 017836 - WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for warranties required by Contract Documents, including manufacturers standard warranties on products and special warranties.
 - 1. Refer to General Conditions for terms of Contractor's period for correction of Work.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures" specifies procedures for submitting warranties.
 - 2. Division 01 Section "Closeout Procedures" specifies contract closeout procedures.
 - 3. Divisions 02 through 14, 21-27, and 31-33 Sections for specific requirements for warranties on products and installations specified to be warranted.
 - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in Contract Documents.
- C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of warranty on Work that incorporates products. Manufacturer's disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 DEFINITIONS

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by manufacturer to Owner.
- B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.4 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as result of such failure or must be removed and replaced to provide access for correction of warranted construction.
- B. Reinstatement of Warranty: When Work covered by warranty has failed and been corrected by replacement or rebuilding, reinstate warranty by written endorsement. Reinstated warranty shall be equal to original warranty with equitable adjustment for depreciation.
- C. Replacement Cost: Upon determination that Work covered by warranty has failed replace or rebuild Work to an acceptable condition complying with requirements of Contract Documents. Contractor is responsible for cost of replacing or rebuilding defective Work regardless of whether Owner has benefited from use of Work through portion of its anticipated useful service life.
- D. Owner's Recourse: Expressed warranties made to Owner are in addition to implied warranties, and shall not limit duties, obligations, rights and remedies otherwise available under law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, or remedies.
 - 1. Rejection of Warranties: Owner reserves right to reject warranties and to limit selection to products with warranties not in conflict with requirements of Contract Documents.
- E. Where Contract Documents require a special warranty, or similar commitment on Work or part of Work, Owner reserves the right to refuse to accept Work, until Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.5 SUBMITTALS

- A. Submit written warranties to Engineer/Architect prior to date certified for Substantial Completion. If Engineer/Architect's Certificate of Substantial Completion designates commencement date for warranties other than date of Substantial Completion for Work, or designated portion of Work, submit written warranties upon request of Engineer/Architect.
- B. When designated portion of Work is completed and occupied or used by Owner, by separate agreement with Contractor during construction period, submit properly executed warranties to Engineer/Architect within 15 days of completion of that designated portion of Work.
 - 1. When Contract Documents require Contractor, or Contractor and subcontractor, supplier or manufacturer to execute a special warranty, prepare written document

that contains appropriate terms and identification, ready for execution by required parties. Submit draft to Owner through Engineer/Architect for approval prior to final execution.

- C. Forms for special warranties are included at end of this Section. Prepare written document utilizing appropriate form, ready for execution by Contractor, or by Contractor and subcontractor, supplier or manufacturer. Submit draft to Owner through Engineer/Architect for approval prior to final execution.
 - 1. Refer to Divisions 02 through 14, 21-27, and 31-33 Sections for specific content requirements and particular requirements for submittal of special warranties
- D. Form of Submittal: At Final Completion compile 2 copies of each required warranty properly executed by Contractor, or by Contractor, subcontractor, supplier, or manufacturer. Organize warranty documents into an orderly sequence based on table of contents of Project Manual.
- E. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8.5 in. by 11in. paper.
 - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product, and name, address, and telephone number of Installer.
 - 2. Identify each binder on front and spine with typed or printed title "WARRANTIES," Project title or name, and name of Contractor.
 - 3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 017836

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SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings and Work Item Unit Quantity Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 01 Section "Closeout Procedures" for general closeout procedures and maintenance manual requirements.
 - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 14, 21-27, and 31-33 Sections for specific requirements for Project Record Documents of products in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one (1) set of marked-up Record Prints.
- B. Record Specifications: Submit one (1) copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one (1) copy of each Product Data submittal.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in the manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation and unit quantity where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Revisions to routing of piping and conduits.
 - d. Revisions to electrical circuitry.
 - e. Actual equipment locations.
 - f. Changes made by Change Order or Construction Change Directive.
 - g. Changes made following Engineer/Architect's written orders.
 - h. Details not on the original Contract Drawings.
 - i. Field records for variable and concealed conditions.
 - j. Record information on the Work that is shown only schematically.
 - k. Actual location and quantity of unit price items of the Work.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Engineer/Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult with Engineer/Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to

other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of the manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Drawings, and Product Data where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer/Architect's reference during normal working hours.

END OF SECTION 017839

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SECTION 020010 - WORK ITEMS

PART 1 - GENERAL

RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Specification Sections apply to this Section.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

WI 1.0 GENERAL REQUIREMENTS

- A. Scope of Work
 - 1. Work consists of performing all tasks, specifically required and incidental, which are not identified under separate Work Item designation, but necessary to perform the work identified in this project. This work includes, but is not limited to the following items:
 - WI 1.1 - Mobilization
 - WI 1.2 - Concrete Formwork
 - WI 1.3 - Concrete Shores and Reshores
 - WI 1.4 - Concrete Reinforcement
 - WI 1.5 - Temporary Signage
 - WI 1.6 - Scaffolding
 - WI 1.7 - Overhead Protection/Traffic Control

WI 1.1 PROJECT MOBILIZATION

- A. Scope of Work
 - 1. Work consists of coordinating, scheduling, obtaining and assembling at construction site all equipment, materials, permits, supplies, manpower and other essentials and incidentals necessary to perform Work defined in this Contract. Payment of lump sum amount for mobilization shall be according to following schedule and shall be based on percentage of original contract amount earned.
- B. Materials
 - 1. None

C. Execution

1. At execution of agreement by all parties, payment of not more than 25% of mobilization lump sum amount.
2. When amount earned is greater than 10% but less than 25% of original contract amount, an additional amount will be paid to bring total payment for mobilization to 50% of mobilization lump sum amount.
3. When amount earned is equal to or greater than 25% but less than 50% of original contract amount, an additional amount will be paid to bring total payment for mobilization to 75% of mobilization lump sum amount.
4. When amount earned is equal to or greater than 50% of original contract amount, an additional amount will be paid to bring total payment for mobilization to 100% of mobilization lump sum amount.

WI 1.2 CONCRETE FORMWORK

B. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to install shoring and formwork as required for cast-in-place concrete.

B. Materials

1. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.
 - a. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form," Class I
 - b. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood," Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.
2. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.
3. Form Coatings: Provide commercial formulation form-coating compounds with a maximum VOC of 350 mg/l that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces, including but not limited to water-curing, curing compound, stains, or paints.
4. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete upon removal. Provide units that will leave no metal closer than 1.5 in. to exposed surface.

- a. Provide ties that, when removed, will leave holes not larger than 1.0 in. diameter in concrete surface.
5. Shores:
 - a. Nail Ellis clamps, if used with wood shores, to shores with minimum of two nails to prevent slipping.
 - b. Wedges: Hardwood or steel. Softwood wedges prohibited.

C. Execution

1. Work shall conform to requirements of ACI 301 "Standard Specifications for Structural Concrete," ACI 302.1 R "Guide for Concrete Floor Slab Construction," ACI 318 "Building Code Requirements for Reinforced Concrete," and ACI 347 "Recommended Practice for Concrete Formwork" except as modified by the following paragraphs.
2. Store all formwork and formwork materials clear of ground, protected, so as to preclude damage.
3. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent leakage of cement paste.
4. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
5. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
6. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
7. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
8. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is placed. Retighten forms and bracing before concrete placement as required to prevent mortar leaks and maintain proper alignment.
9. Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds

10. Coat contact surfaces of forms with accepted, nonresidual, low-VOC form-coating compound before reinforcement is placed.
11. Coat steel forms with non-staining, rust-preventive form oil or otherwise protect against rusting. Rust-stained steel formwork not acceptable.
12. For post-tensioned concrete, formwork shall remain in place until post-tensioning has been completed. Do not place additional loads on structure until concrete has been properly reshored.
13. For non-post-tensioned concrete, formwork shall remain in place until concrete has reached minimum two-thirds of 28-day strength. Do not place additional loads on structure until concrete has been properly reshored.
14. Clean and repair surfaces of forms to be re-used in Work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.
15. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to Engineer/Architect.

WI 1.3 CONCRETE SHORES AND RESHORES

C. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to install temporary shoring and to maintain shores in place until restoration Work requiring shores and associated concrete has properly cured.

B. Materials

1. Shores shall be steel, rated at a minimum allowable load of 4,500 lb at 12 ft extension or steel shoring towers rated at a minimum allowable load of 40,000 lbs per four leg tower (based on two 20,000 lb crossed braced frames.).

C. Execution

1. Comply with ACI 301 and ACI 347 for shoring and reshoring in multi-story construction, except as modified in this Section.
2. For purpose of calculations: Construction Load = 50 psf; Dead Load = 80 psf for the floor slab plus the dead load of beams and girders..
3. Shore/Reshore loads on the structure shall not exceed 40 psf distributed load on the slab and precast double tees, and concentrated loads shall not exceed posted wheel loads or 2,000 lbs., whichever is less. Concentrated bearing pressures shall not exceed 1,200 psi.
4. Shore/Reshore loads on concrete slab-on-grade shall be distributed by steel grillage or timber grillage so as not to exceed soil bearing capacity or 1,500 psf, whichever is smaller.

5. Shore/Reshore loads on asphalt slab-on-grade shall be distributed by steel grillage so as not to exceed asphalt/soil bearing capacity, with consideration of reduced asphalt bearing capacity during extreme hot weather.
6. Shore/Reshore loads shall be distributed horizontally and/or distributed to more than one level to meet shore/reshore load limitations.
7. Shore/Reshore loads shall be distributed to multiple framing members (beams/joists/double tee stems) and extend beyond the immediate work area to ensure proper distribution of loads throughout the structure.
8. Prior to installation of shores, Contractor shall submit shoring scheme prepared and sealed by **registered Professional Engineer** in Massachusetts.
9. Engineer/Architect will review shoring scheme for general conformance to requirements stated herein. If it does not conform, Contractor will be informed to resubmit another shoring scheme. See requirements of Division 1 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
10. Remove shores and reshore in planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to safely support Work without excessive stress or deflection.
11. Keep reshores in place as required until heavy loads due to construction operations have been removed.
12. If during construction, modifications are necessary to accommodate other trades, revise and resubmit erection plan to Engineer/Architect for review.

WI 1.4 CONCRETE REINFORCEMENT

D. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals necessary to fabricate and install all mild steel reinforcement and epoxy coated reinforcement.

B. Materials

1. Reinforcement materials shall be as specified in ACI 301 "Standard Specifications for Structural Concrete."
2. Welded wire reinforcement: provide mats only. Roll stock prohibited.
3. Epoxy Coating Materials for Reinforcement: ASTM A775 and A884:
4. Supplier shall be certified currently under CRSI Fusion Bonded Epoxy Coating Applicator Plant Certification Program.
5. Provide one of following epoxy coatings for reinforcement and steel accessories as noted on the Drawings:
 - a. "Scotchkote 413," by 3M Company, St. Paul, MN.
 - b. "Nap-Gard 7-2719," by DuPont Powder Coatings, USA, Inc.
6. Use patching material recommended by epoxy powder manufacturer, compatible with epoxy coating and inert in concrete. Acceptable materials are as follows:
 - a. "Scotchkote 413/215," by 3M Company, St. Paul, MN.

- b. "MasterEmaco P124," by BASF Building Systems, Shakopee, MN.
 - c. "Duralprep AC," by The Euclid Chemical Company, Cleveland, OH.
 - d. "Sika Armatec 110 EpoCem," by Sika Corporation, Lyndhurst NJ.
7. Corrosion Inhibiting Coating for Existing Exposed Non-prestressed Steel Reinforcement or Welded wire reinforcement:
- a. "MasterEmaco ADH 326," by BASF Building Systems, Shakopee, MN.
 - b. "Euco 452", or "Duralcrete Series" by The Euclid Chemical Company, Cleveland, OH.
 - c. "Sikadur 32 Hi-Mod LPL," by Sika Corporation, Lyndhurst, NJ.
 - d. "Sika Armatec 110 EpoCem," by Sika Corporation, Lyndhurst NJ.

C. Execution

- 1. Work shall conform to requirements of ACI 301 "Standard Specifications for Structural Concrete," ACI 315-80 "Details and Detailing of Concrete Reinforcement," ACI 318 "Building Code Requirements for Reinforced Concrete," and Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
- 2. Submittals required include: Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, and others as requested by Engineer/Architect including, but not limited to:
 - a. Manufacturer's product data and installation instructions for proprietary form coatings, manufactured form systems, ties, and accessories.
 - b. Steel producer's certificates of mill analysis, tensile tests, and bend tests.
 - c. Manufacturer's product data, specifications, and installation instructions for proprietary materials, welded and mechanical splices, and reinforcement accessories.
 - d. Corrosion Inhibitor for Reinforcement:
 - 1) Written certification from coating manufacturer that coating resin for reinforcement has been approved by National Bureau of Standards.
 - 2) Written information from coating manufacturer on proper use and application of coating resin.
 - 3) Coating applicator's written certification of results of quality control program.
 - e. Submit all materials and methods for concrete curing to Engineer/Architect for approval before beginning concreting Work. Include certification of curing compound allowable moisture loss.
- 3. Store concrete reinforcement materials at site to prevent damage and accumulation of dirt or excessive rust.
- 4. Epoxy Coated Reinforcement:
 - a. Contact areas of handling and hoisting systems shall be padded or be made of nylon or other acceptable material.

- b. Use spreader bars to lift bundles of coated steel to prevent bar-to-bar abrasion.
 - c. Pad bundling bands or fabricate of nylon or other acceptable material.
 - d. Store coated steel on padded or wooden cribbing.
 - e. Do not drag coated steel members.
 - f. After placement, restrict traffic on coated steel to prevent damage.
5. Reinforcement with any of following defects will be rejected:
- a. Lengths, depths and bends exceeding CRSI fabrication tolerances.
 - b. Bends or kinks not indicated on Drawings or final Shop Drawings.
 - c. Reduced cross-section due to excessive rusting or other cause.
6. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as herein specified.
- a. Avoiding cutting or puncturing vapor retarder during reinforcement placement and concreting operations.
 - b. Examine conditions under which concrete reinforcement is to be placed, and immediately notify Engineer/Architect in writing of unsatisfactory conditions. Do not proceed with Work until unsatisfactory conditions have been corrected in acceptable manner.
 - c. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
 - d. Fabricate reinforcement to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI MSP. In case of fabricating errors, do not re-bend or straighten reinforcement in manner that will injure or weaken material.
 - e. Bends in reinforcement are standard 90° bends unless noted otherwise.
 - f. Reinforcement with any of following defects will be rejected:
 - 1) Lengths, depths and bends exceeding CRSI fabrication tolerances.
 - 2) Bends or kinks not indicated on Drawings or final Shop Drawings.
 - 3) Reduced cross-section due to excessive rusting or other cause.
 - g. Perform all welding of mild steel reinforcement, metal inserts and connections with low hydrogen welding electrodes in accordance with AWS D1.4.
 - h. Epoxy coated reinforcement: Fabricator and applicator to provide installer with written instructions to handle, store and place epoxy coated reinforcement to prevent damage to coating.
 - i. Comply with ACI 301, Chapter 3 for placing reinforcement.
 - j. Use rebar chairs and accessories to hold all reinforcing positively in place. Provide rebar chairs at all formed surfaces, both vertical and horizontal, to maintain minimum specified cover. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces. Maximum spacing of chairs and accessories shall be per CRSI Manual of Standard Practice. In situations not covered by CRSI, provide support at 4 ft on center maximum each way.

- k. Install welded wire reinforcement in as long lengths as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- l. Splices:
 - 1) Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements of ACI 318 for minimum lap of spliced bars.
 - 2) For mechanical tension splices of reinforcement:
 - a) Column bar lengths shall not exceed 30 ft between splices. In any bar, no splices shall occur at any floor level.
 - b) Exercise care to assure that no reduction of cross-sectional area of reinforcement occurs.
 - c) Use Barsplice Products, Inc., Bar-Grip or Grip-Twist, NMB Splice Sleeve, or Erico LENTON splices.
 - d) For all mechanical splices, perform splicing in strict accordance with manufacturer's requirements and instructions.
 - e) All splices to develop 125% of specified yield strength of bars, or of smaller bar in transition splices.
 - f) Stagger splices in adjacent bars.
 - g) Except where shown on Drawings, welding of reinforcement prohibited without prior written authorization by Engineer/Architect.
 - 3) Compression splices: Mechanically coupled splices in accordance with ACI 318, Chapter 12.
- m. Epoxy Coated Reinforcement:
 - 1) Rest epoxy coated steel members supported from formwork on coated wire bar supports, or on bar supports made of dielectric material or other suitable material.
 - 2) Coat wire bar supports with dielectric material for minimum distance of 2 in. from point of contact with coated steel member.
 - 3) Fasten epoxy-coated steel members with nylon-, epoxy-, or plastic-coated tie wire, or other suitable material acceptable to Engineer/Architect.
 - 4) Mechanical connections, when required, shall be installed in accordance with splice device manufacturer's recommendations. Repair any damage to coating.
 - 5) All parts of mechanical connections on epoxy-coated steel, including steel splice sleeves, bolts, and nuts shall be coated with same material used for repair of coating damage.
 - 6) Do not cut epoxy-coated steel unless permitted by Engineer/Architect. When cut, coat ends with material used for repair of coating damage.
 - 7) All welding of epoxy-coated steel shall conform to AWS D1.4.
 - 8) Adequate ventilation shall be provided when welding epoxy-coated steel.

- 9) After welding, repair coating damage as specified in Part 3 heading "Quality Control Testing During Construction," paragraph "Epoxy Coated Material."

WI 1.5 TEMPORARY SIGNAGE

E. Scope of Work

1. Work consists of furnishing all labor, materials, equipment and supervision necessary to provide and install and remove following completion of project, temporary signage as required for traffic control and user information during construction and as required by Owner/Engineer/Architect.

B. Materials

1. Temporary signage shall meet following minimum requirements:
 - a. Minimum size: 48" x 48"
 - b. Backing material: 0.5 in. medium density overlay plywood.
 - c. Colors:
 - 1) Background: medium orange or white.
 - 2) Symbols/Lettering: black
 - d. Lettering: silk screened or die-cut.
 - 1) Font Style: Helvetica or similar.
 - 2) Size: 2 in. high minimum for pedestrian information; 4 in. high minimum for traffic information.

C. Execution

1. Mounting height: 5 ft. to bottom of sign. Provide mounting brackets as required.
2. Contractor shall submit shop drawings detailing sign size, layout, colors, and mounting schemes for approval prior to fabricating signs and mounting brackets.
3. Typical regulatory signs (that is, STOP, YIELD, etc.) and "Handicap" signs shall conform to all Federal, state, and local requirements for sizes, materials, and colors.

WI 1.6 SCAFFOLDING

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to provide, erect, operate, maintain and remove fixed or suspended scaffolding, work platforms/lifts and/or other similar equipment necessary to access exterior work areas as needed to complete work outlined in Construction Documents.

B. Materials

1. Where suspended scaffolds are used, contractor shall employ an outrigger support system that does not bear on the parapet wall.
2. Parapet hooks/clamps shall not be used on masonry type parapet walls.
3. The contractor is responsible for distributing the staging and support system loads to the roof in a manner which will not damage any part of the roof system, or overload the roof structural elements.
4. Suspended scaffolds and/or buckets shall be of the motorized type (no rope stages allowed), capable of handling labor, equipment and material loads required for the project.
5. Electrical system shall be checked for voltage drop along the power cords for power supply. Special power supply may be needed to assure uninterrupted services.
6. Suitable existing electrical power supply/connection for construction work is not guaranteed by Owner.
 - a. Contractor is responsible for determining suitability of existing power supply/connection considered for use during construction, and that use will not cause power disruption to building Owner/occupants.
 - b. If suitable power connection does exist, Contractor is responsible for installing, maintaining and removing upon completion of work, suitable connections, meeting all local electrical code requirements.
 - c. If existing power supply is inadequate, Contractor is responsible for providing alternate power supply and suitable connections meeting all local electrical code requirements for construction.

C. Execution

1. Contractor shall verify and provide documentation upon request that verifies erection, maintenance and removal of scaffolding (fixed or movable), and all rigging is in accordance with OSHA standards.
2. Contractor personnel erecting, operating, maintaining and removing scaffold and rigging equipment shall be certified/trained according to current standards of the scaffold and construction industry.
3. Contractor shall submit to Owner and Engineer a detailed action plan for their scaffolding (erection, maintenance and removal) prior to proceeding for general conformance and informational purposes only.
4. Independent lifelines shall be provided for every person working on suspended scaffolding, per scaffold industry standards. Lifelines shall not be secured to the same points used for suspended scaffold rigging connections.
5. Contractor shall provide access to Architect/Engineer or appointed project representative for performing observations and/or punchlist inspections during the work.

WI 1.7 OVERHEAD PROTECTION / TRAFFIC CONTROL

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to: provide, erect, maintain and remove following completion of project overhead protection for vehicles and pedestrians, necessary to protect and control the project site for the duration of the project; and provide and install and remove following completion of project, traffic control barricades/fences, and all other traffic controls as required for vehicular and pedestrian traffic control and user information during construction and as required by Owner and Engineer/Architect.

B. Materials

1. Overhead protection shall be capable of handling all construction loads, and shall be a manufactured frame type with ceiling providing overhead protection. The overhead protection shall provide protection from falling materials typically encountered during building repair projects, and be waterproofed. All exposed surfaces shall be maintained to the owner's satisfaction, including
2. Barricades/barriers shall at minimum 4 ft. 0 in. high solid temporary barrier constructed of wood or concrete to separate Work areas from areas open to public.

C. Execution

1. Contractor shall submit a detailed action plan to Owner and Engineer for overhead protection, and traffic control prior to mobilizing for general conformance and informational purposes only.
2. Erect overhead protection as required to make project site safe for public. Under no circumstances shall construction work be performed without site protection in place to safeguard public.
3. Appropriate barricades for traffic control shall be provided to the satisfaction of the Owner to adequately inform the public (pedestrians and vehicles) of construction operations and how they are to proceed in and around the building site.
4. After removal of overhead protection/traffic controls, clean areas affected by these elements to condition prior to installation.

WI 2.0 FLOOR SURFACE PREPARATION

WI 2.6 FLOOR PREPARATION - TRAFFIC TOPPING / MEMBRANE REMOVAL

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove traffic toppings or other bonded waterproofing membrane from concrete floor slab as shown on Drawings, and disposal of material at an approved site.

B. Materials/Equipment

1. Equipment used shall not exceed weight or clearance restrictions currently in force for structure. No equipment may be used which, in opinion of Owner or Engineer/Architect, will damage existing structural system.
2. Equipment used shall leave a surface profile acceptable to manufacturer of traffic topping/membrane for re-application of traffic topping/membrane.

C. Execution

1. Remove existing traffic topping/membrane from concrete floor slab by mechanical means.
2. Clean final slab surface, after removal, by water and air blasting so Engineer/Architect may inspect and determine additional repair areas. All debris incidental to traffic topping/membrane removal and surface cleaning shall be removed from deck and properly disposed of before inspection begins.
3. Incidental damage to floor slab caused by removal operations shall be corrected to satisfaction of Engineer/Architect at no additional cost to Owner.
4. Preparation of spall and delamination cavities prior to placement of concrete patch or overlay materials is not part of Work of this Work Item.

WI 3.0 CONCRETE FLOOR REPAIR

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities and install patching material to restore floor slab to original condition and appearance. Refer to Detail Series 3.0 for specific requirements.

B. Materials

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration," "Cast-in-Place Repair Mortar" and/or Section "Unbonded Post-Tensioned Concrete."
2. Conventional steel reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item "Concrete Reinforcement."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation." Remove all unsound concrete within marked boundary prior to sawcutting and preparation of patch edges.
3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting as specified in Section "Surface Preparation for Patching," Article "Cleaning of

Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with an approved corrosion inhibitor as specified in Section "Surface Preparation for Patching."

5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
6. Patch materials and associated reference specifications are listed in Work Item "Concrete Floor Repair," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 3.2LR FLOOR REPAIR - PARTIAL DEPTH

- A. Refer to Work Item "Concrete Floor Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 3.2LR for specific requirements.

WI 3.3LR FLOOR REPAIR - FULL DEPTH

- A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and remove full depth unsound floor concrete, prepare cavity, and install patching material to restore floor to original integrity and appearance. Refer to Detail 3.3LR for specific requirements.

- B. Materials

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Section "Unbonded Post-Tensioned Concrete."
2. Conventional steel reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item "Concrete Reinforcement."

- C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. All concrete shall be removed from within marked boundaries until sound concrete is reached on all sides.
3. Sawcut shall then be made approximately 3 in. from edge of cavity. This sawcut shall be to depth of 0.75 in. and all edges shall be straight. Underside of slab shall have its repair edge ground to depth of 0.5 in. Patches shall be as square or rectangular-shaped as practical. All concrete within sawcut shall be removed to minimum depth of 0.75 in. Also see Section Surface Preparation for Patching," Article "Preparation."

4. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
5. All steel exposed within cavities shall be cleaned to bare metal by sandblasting and mechanical means according to Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall receive corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
6. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
7. Patch materials and associated reference specifications are listed in Work Item "Floor Repair - Full Depth," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 3.4 FLOOR REPAIR – CURBS / WALKS

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate existing spalls, locate and remove delaminated and unsound concrete from curbs, prepare cavities and install patching material to restore curbs to original condition and appearance. Refer to Detail 3.4 for specific requirements.

B. Materials

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Repair Mortar."
2. Conventional steel reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item "Concrete Reinforcement."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation." Remove all unsound concrete within marked boundaries prior to sawcutting and preparation of patch edges.
3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting as specified in Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas."

- Exposed steel shall be coated with an approved corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
 6. Patch materials and associated reference specifications are listed in Work Item "Floor Repair - Curbs," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 3.5 FLOOR REPAIR - PARTIAL DEPTH / CAST-IN-PLACE

- A. Refer to Work Item "Concrete Floor Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 3.5 for specific requirements.

WI 3.6 FLOOR REPAIR - FULL DEPTH / CAST-IN-PLACE

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and remove full depth unsound floor concrete, prepare cavity, and install patching material to restore floor to original integrity and appearance. Refer to Detail 3.6 for specific requirements.

B. Materials

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Section "Cast-in-Place Repair Mortar."
2. Conventional steel reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item "Concrete Reinforcement."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. All concrete shall be removed from within marked boundaries until sound concrete is reached on all sides.
3. Sawcut shall then be made approximately 3 in. from edge of cavity. This sawcut shall be to depth of 0.75 in. and all edges shall be straight. Underside of slab shall have its repair edge ground to depth of 0.5 in. Patches shall be as square or rectangular-shaped as practical. All concrete within sawcut shall be removed to minimum depth of 0.75 in. Also see Section "Surface Preparation for Patching," Article "Preparation."
4. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
5. All steel exposed within cavities shall be cleaned to bare metal by sandblasting and mechanical means according to Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and

- damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall receive corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
6. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
 7. Patch materials and associated reference specifications are listed in Work Item "Floor Repair - Full Depth," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 3.7LL FLOOR REPAIR – CONCRETE WASHES

A. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and remove existing concrete washes, and install new washes.

B. Materials

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Section "Cast-in-Place Repair Mortar."
2. Conventional Steel Reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item "Concrete Reinforcement."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. Engineer/Architect shall inspect preparation according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
3. All steel exposed within cavities shall be cleaned to bare metal by sandblasting as specified in Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with an approved corrosion inhibitor coating as specified in Work Item "Concrete Reinforcement."
4. Contractor shall prepare surfaces for concrete wash placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
5. Patch materials and associated reference specifications are listed in Work Item "Floor Repair – Concrete Washes," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 3.8LR FLOOR REPAIR – SCALED CONCRETE SURFACE

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate scaled concrete, prepare surface and fill scaled areas to accept traffic topping.

B. Materials

1. Concrete repair materials shall be as specified in Section “Cast-in-Place Repair Mortar,” Article “Thin Surface Patching Mortar.”

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section “Surface Preparation for Patching,” Article “ Inspection.”
2. Contractor shall shotblast floor surface prior to placing repair material.
3. Surface shall then be cleaned by air blasting.
4. Engineer/Architect shall inspect surface for condition according to Section “Surface Preparation for Patching,” Article “Inspection of Repair Preparation.”
5. Surface must be clean and dry. Apply epoxy floor resin mixed with silica sand per manufacturer’s recommendations.

WI 3.9LR FLOOR REPAIR – DEEP SCALED CONCRETE SURFACE

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate scaled concrete, prepare surface and fill scaled areas to accept traffic topping.

B. Materials

1. Concrete repair materials shall be as specified in Section “Cast-in-Place Repair Mortar,” Article “Thin Surface Patching Mortar.”

C. Execution

1. Contractor shall locate and mark all work areas as specified in Section “Surface Preparation for Patching,” Article “ Inspection.”
2. Contractor shall shotblast floor surface prior to placing repair material.
3. Surface shall then be cleaned by air blasting.
4. Engineer/Architect shall inspect surface for condition according to Section “Surface Preparation for Patching,” Article “Inspection of Repair Preparation.”
5. Surface must be clean and dry. Apply surface patching mortar per manufacturer’s recommendations.

WI 3.10 FLOOR REPAIR – STAIR NOSING REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment. Supervision and incidentals necessary to locate existing spalled or delaminated stair nosing, removal of embedded metal nosing, removal of deteriorated and unsound concrete, prepare cavities, and install patching material [and prefabricated non-slip tread/nosing] to restore stair to serviceable condition. Refer to Detail 3.10 for specific requirements.

B. Materials

1. Trowel applied patching material shall be specified in Section "Trowel Applied Mortar."
2. Deep/large placements concrete shall be as specified in Section "Cast-in-Place Repair Mortar."
3. Dowels shall be stainless steel, Type 304, threaded set in approved epoxy.
4. High modulus, high strength epoxy paste resin adhesive with either rapid set or extended working time.

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation." Remove all unsound concrete within marked boundary prior to sawcutting and preparation of patch edges.
3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting and mechanical means as specified in Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with an approved corrosion inhibitor coating in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
6. Patch materials and associated reference specifications are listed in Work Item "Concrete Floor Repair," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 3.11LR FLOOR REPAIR – REPLACE PEDESTRIAN BRIDGE DECK SLAB

B. Scope of Work

1. This Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove and replace the concrete slab and metal deck that comprises the deck of the Level 2 pedestrian bridge. . Refer to Detail 3.11 for specific requirements.

C. Materials

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration."
2. Conventional steel reinforcement shall be as specified in Work Item "Concrete Reinforcement."
3. Steel Decking shall be galvanized Vulcraft "1.0c20" or Engineer Approved Equivalent.

D. Execution

1. The concrete slab and metal deck shall be removed in their entirety using methodology that minimizes damage to the underlying structural steel framing.
2. Once slab and metal deck is removed, Engineer/Architect shall inspect condition of structural steel framing and identify any required repairs to supplement areas of significant loss of steel section.
3. Prior to installing new bridge deck all steel exposed shall be cleaned according to Section "Exterior Painting" and Work Item 45.3 "Paint Level 2 Bridge Structural Steel Framing.
4. Prior to installing new bridge deck all steel exposed shall be primed and painted according to Section "Exterior Painting."

WI 4.0 CONCRETE CEILING REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities and install patching material to restore ceilings to original condition and appearance. Refer to Detail Series 4.0 for specific requirements.

B. Materials

1. Trowel applied patching material shall be as specified in Section "Trowel Applied Mortar." This material may be used for shallow removal and repair Work Items only.
2. Form and pour/pump repair materials shall be as specified in Section "Cast-in-Place Repair Mortar."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."

2. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation."
3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting and mechanical means as specified in Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with an approved corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for patch placement in accordance with Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
6. Patch materials and associated reference specifications are listed in Work Item "Concrete Ceiling Repair," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 4.1 CEILING REPAIR - PARTIAL DEPTH / SHALLOW

- A. Refer to Work Item "Concrete Ceiling Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 4.1 for specific requirements.

WI 4.2 CEILING REPAIR - PARTIAL DEPTH / DEEP

- A. Refer to Work Item "Concrete Ceiling Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 4.2 for specific requirements.

WI 5.0 CONCRETE BEAM AND JOIST REPAIR

- A. Scope of Work
 1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities and install patching materials to restore concrete beams and joists to original condition and appearance. Refer to Detail Series 5.0 for specific requirements.
- B. Materials
 1. Form and pour or pump repair materials shall be as specified in Section "Cast-in-Place Repair Mortar."
 2. Trowel applied patching material shall be as specified in Section "Trowel Applied Mortar." This material may be used for shallow removal and repair Work Items only.

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection." Contractor shall identify all critical repair work areas prior to start of work. Engineer/Architect shall verify critical repair area identification.
2. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation."
3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting and mechanical means according to Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with an approved corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
6. Shoring support shall be provided as necessary and in accordance with Work Item "Concrete Shores and Reshores."
7. Patch materials and associated reference specifications for patches in non-critical areas are listed in Work Item "Concrete Beam and Joist Repair," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 5.1 BEAM REPAIR - PARTIAL DEPTH / SHALLOW

- A. Refer to Work Item "Concrete Beam and Joist Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 5.1 for specific requirements.

WI 5.2 BEAM REPAIR - PARTIAL DEPTH / DEEP

- A. Refer to Work Item "Concrete Beam and Joist Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 5.2 for specific requirements.

WI 5.3LL BEAM REPAIR – PARTIAL DEPTH/SHALLOW

- A. Refer to Work Item "Concrete Beam and Joist Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 5.3LL for specific requirements.

WI 5.4LL BEAM REPAIR - PARTIAL DEPTH / DEEP

- A. Refer to Work Item "Concrete Beam and Joist Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 5.4LL for specific requirements.

WI 5.5LR BEAM REPAIR - PARTIAL DEPTH / SHALLOW @ EXPANSION JOINT

- A. Refer to Work Item "Concrete Beam and Joist Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 5.5LR for specific requirements.

WI 6.0 CONCRETE COLUMN REPAIR

- A. Scope of Work
 - 1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities and install patching materials to restore concrete columns to original condition and appearance. Refer to Detail Series 6.0 for specific requirements.
- B. Materials
 - 1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration and/or Section "Cast-in-Place Repair Mortar."
 - 2. Trowel applied patching material shall be as specified in Section "Trowel Applied Mortar." This material may be used for shallow removal and repair Work Item only.
- C. Execution
 - 1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
 - 2. Procedure for delaminated and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation."
 - 3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
 - 4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting according to Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with an approved corrosion inhibitor as specified in Section "Surface Preparation for Patching."
 - 5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
 - 6. Patch materials and associated reference specifications are listed in Work Item "Concrete Column Repair," Article "Materials," above. Patch installation

procedures shall be in accordance with referenced specifications for selected material.

WI 6.1 COLUMN REPAIR – PARTIAL DEPTH/SHALLOW

- A. Refer to Work Item "Concrete Column Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 6.1 for specific requirements.

WI 6.2 COLUMN REPAIR – PARTIAL DEPTH/DEEP

- A. Refer to Work Item "Concrete Column Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 6.2 for specific requirements.

WI 6.3LR COLUMN REPAIR - PARTIAL DEPTH/SHALLOW @ EXPANSION JOINT

- A. Refer to Work Item "Concrete Column Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 6.3LR for specific requirements.

WI 6.4LR COLUMN REPAIR – PARTIAL DEPTH/DEEP @ EXPANSION JOINT

- A. Refer to Work Item "Concrete Column Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 6.4LR for specific requirements.

WI 6.6LL COLUMN REPAIR – HAUNCHES

- B. Refer to Work Item "Concrete Column Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 6.6LL for specific requirements.

WI 7.0 CONCRETE WALL REPAIR

- A. Scope of Work
 - 1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate existing spalls, locate and remove delaminated and unsound concrete, prepare cavities and place patching materials to restore concrete walls to original condition and appearance. Refer to Detail Series 7.0 for specific requirements.
- B. Materials

1. Trowel applied patching material shall be as specified in Section "Trowel Applied Mortar." This material may be used for shallow removal and repair Work Item only.
2. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration and/or Section "Cast-in-Place Repair Mortar."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation."
3. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
4. All steel exposed within cavities shall be cleaned to bare metal by sandblasting according to Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with an approved corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
5. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
6. Patch materials and associated reference specifications are listed in Work Item "Concrete Wall Repair," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.
7. Contractor shall take care to protect adjacent areas from overspray if "Shotcrete" is used. Area adjacent to repair shall be cleaned to Owner's satisfaction prior to leaving site.

WI 7.1 WALL REPAIR - PARTIAL DEPTH / SHALLOW

- A. Refer to Work Item "Concrete Wall Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 7.1 for specific requirements.

WI 8.0 PRECAST TEE BEAM REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals including shoring necessary to locate, support and repair damaged or deteriorated tee beams. Refer to Detail Series 8.0 for specific requirements.

B. Materials/Equipment

1. Trowel applied patching material shall be as specified in Section "Trowel Applied Mortar." This material may be used for shallow removal and repair Work Items only.
2. Concrete repair materials shall be as specified in Section "Cast-in-Place Repair Mortar" and/or Section "Cast-in-Place Concrete Restoration."
3. Chipping hammers shall be 15 lb or less unless directed by Engineer/Architect.

C. Execution

1. Contractor shall locate and mark tee beam repairs indicated on Drawings according to Section "Surface Preparation for Patching," Article "Inspection."
2. Contractor shall provide shoring as required in accordance with Section "Cast-in-Place Concrete Restoration." Submit Shop Drawings according to Section "Submittals" and receive Engineer/Architect's approval prior to starting removal operations.
3. Procedure for delaminated, spalled and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation."
4. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
5. All steel exposed within cavities shall be cleaned to bare metal by sandblasting as specified in Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." Exposed steel shall be coated with approved corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
6. Contractor shall prepare cavities for patch placement in accordance with Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
7. Patch materials and associated reference specifications are listed in Work Item "Precast Tee Beam Repair," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.
8. Contractor shall maintain forms and shores in place until concrete has attained at least 75% of 28-day strength.

WI 8.1LL TEE STEM REPAIR - PARTIAL DEPTH / SHALLOW

- A. Refer to Work Item "Precast Tee Beam Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 8.1LL for specific requirements.

WI 8.2LL TEE STEM REPAIR - PARTIAL DEPTH / DEEP

- A. Refer to Work Item "Precast Tee Beam Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 8.2LL for specific requirements.

WI 8.3LL TEE STEM REPAIR - ENCASEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate extensively cracked or spalled and delaminated tee stems, shore tee stems, remove deteriorated concrete, prepare cavity and install reinforced concrete tee stem encasement. Refer to Detail 8.3LL for specific requirements.

B. Materials/ Equipment

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Section "Cast-in-Place Repair Mortar."
2. Conventional steel reinforcing shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item "Concrete Reinforcement."
3. Chipping hammers shall be 15 lb or less as directed by Engineer/Architect.

C. Execution

1. Contractor shall locate and mark Work areas. Tee beams that are cracked full depth with cracks wider than 0.03 in. shall be repaired. Engineer/Architect shall verify Work areas.
2. Both beams at end of tee being repaired shall be shored in accordance with Section "Cast-in-Place Concrete Restoration."
3. Existing location of prestressing strands shall be determined before Work commences.
4. Tee flange concrete shall be removed as required in accordance with other Work Items.
5. Cracked tee beam concrete shall remain in place. Do not completely remove concrete from around reinforcement unless approved by Engineer/Architect.
6. Following necessary concrete removals, concrete beam surface should be roughened to 0.25 in. amplitude.
7. Core 1 in. dia. holes in stem for #4 bent bars. Exercise caution to avoid damage to prestressing strand and other reinforcement.
8. Install mild steel reinforcing in accordance with Section "Cast-in-Place Concrete Restoration" and Drawings.
9. Install formwork as required to conform to dimensions as shown on Details.
10. Patch materials and associated reference specifications are listed in Work Item "Tee Beam Repair - Encasement," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.
11. Shop drawings for Work shall be submitted in accordance with General Conditions.

WI 8.4LL TEE FLANGE REPAIR - PARTIAL DEPTH

- #### **A.**
- Refer to Work Item "Precast Tee Repair" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 8.4LL for specific requirements.

WI 8.5LL TEE FLANGE REPAIR - FULL DEPTH

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals, including shoring, necessary to locate and remove full depth unsound tee flange concrete, prepare cavity, and install patching material to restore tee flange and topping to original integrity and appearance. Refer to Detail 8.5LL for specific requirements.

B. Materials

1. Cast-in-place concrete materials shall be as specified in Section "Cast-in-Place Concrete Restoration."
2. Mild steel reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item "Concrete Reinforcement."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Section "Surface Preparation for Patching," Article "Inspection."
2. Contractor shall provide shoring from grade to tee flange being repaired. Submit shop drawings in accordance with Section "Submittals" and receive Engineer/Architect's approval prior to starting removal operations.
3. Procedure for delaminated, spalled, and unsound concrete removal shall be as specified in Section "Surface Preparation for Patching," Article "Preparation."
4. Prior to sawcutting, Contractor shall verify position of prestressing strand in tee stems so that strand is not cut. Sawcut shall then be made approximately 3 in. from edge of cavity. This sawcut shall be to depth of 1 in. and all edges shall be straight. Underside of slab shall have its repair edge ground to depth of ½ in. Patches shall be as square or rectangular-shaped as practical. All concrete within sawcut shall be removed to minimum depth of 1 in. Also see Section "Surface Preparation for Patching," Article "Preparation."
5. Repair areas shall be prepared using chipping hammers of 15 lb or less as directed by Engineer/Architect.
6. Engineer/Architect shall inspect all cavities for condition according to Section "Surface Preparation for Patching," Article "Inspection of Repair Preparation."
7. All steel exposed within cavities shall be cleaned to bare metal by sandblasting according to Section "Surface Preparation for Patching," Article "Cleaning of Reinforcement within Delamination and Spall Cavities," and damaged and defective reinforcement replaced as specified in Section "Surface Preparation for Patching," Article "Reinforcement and Embedded Materials in Repair Areas." All exposed steel shall be coated with an approved corrosion inhibitor coating as specified in Section "Surface Preparation for Patching."
8. Contractor shall prepare cavities for patch placement as specified in Section "Surface Preparation for Patching," Article "Preparation of Cavity for Patch Placement."
9. Installation of new epoxy coated reinforcement shall be in accordance with Section "Cast-in-Place Concrete Restoration."

10. Patch materials and associated reference specifications are listed in Work Item "Tee Flange Repair - Full Depth," Article "Materials," above. Patch installation procedures shall be in accordance with referenced specifications for selected material.

WI 9.0 CRACKS AND JOINTS - EXPANSION JOINT EDGE PREPARATION

WI 9.1LL EXPANSION JOINT PREPARATION – NEW BLOCKOUT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate the Work area, remove sound floor slab concrete as required, and place patch or fill material to prepare cavity to receive new expansion joint systems. Refer to Detail 9.1LL for specific requirements and installation conditions. This Work shall be coordinated with Work Item "Expansion Joint Repair and Replacement."

B. Materials

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Mortar."
2. Trowel applied material shall be as specified in Section "Trowel Applied Mortar."

C. Execution

1. Contractor shall remove existing expansion materials in manner that minimizes damage to adjacent concrete. Alterations to existing expansion joint blockout required for installation of new expansion joint system shall be performed in accordance with Work Item "Expansion Joint Preparation – New Blockout" and Section "Surface Preparation for Patching."
2. Contractor shall locate and mark all expansion joint installation areas as located on Drawings.
3. All concrete requiring removal from within marked boundaries shall be sawcut and chipped to dimensions detailed. Caution shall be exercised during sawcutting operations to avoid damaging existing reinforcement near surface of concrete.
4. Spalls and delaminations located within blockout shall be patched in accordance with Work Item "Concrete Floor Repair."
5. Repair materials and associated reference specifications are listed in Work Item "Expansion Joint Preparation – New Blockout," Article "Materials," above. Repair installation procedures shall be in accordance with referenced specifications for selected material.

WI 9.2LL EXPANSION JOINT PREPARATION – NEW CONCRETE WASH AND BLOCKOUT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate Work area, remove sound floor slab concrete prepare cavity surface and install concrete wash and expansion joint blockout. Refer to Detail 9.2LL for specific requirements. This Work shall be coordinated with Work Item "Expansion Joint Repair and Replacement."

B. Material

1. Concrete repair materials shall be as specified in Section "Cast-in-Place Repair Mortar."

C. Execution

1. Contractor shall remove existing expansion materials in manner that minimizes damage to adjacent concrete. Alterations to existing expansion joint blockout required for installation of new expansion joint system shall be performed in accordance with Work Item "Expansion Joint Preparation – New Concrete Wash with Blockout" and Section "Surface Preparation for Patching."
2. Contractor shall locate and mark wash installation areas as located on Drawings.
3. All sound and unsound concrete shall be removed from within marked boundaries by sawcutting and chipping to sufficient width and depth as described in Detail 9.2. Caution shall be exercised during sawcutting operations to avoid damaging existing reinforcement near surface of concrete.
4. Spalls and delaminations located within wash area shall be patched in accordance with "Concrete Floor Repair."
5. Repair materials and associated reference specifications are listed in Work Item "Expansion Joint Preparation – New Concrete Wash with Blockout," Article "Materials" above. Repair installation procedures shall be in accordance with referenced specifications for selected material.

WI 9.3LR EXPANSION JOINT PREPARATION – REPAIR CONCRETE WASH AND BLOCKOUT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate Work area, remove unsound concrete wash prepare cavity surface and repair concrete wash and expansion joint blockout. Refer to Detail 9.2LR for specific requirements. This Work shall be coordinated with Work Item "Expansion Joint Repair and Replacement."

B. Material

1. Concrete repair materials shall be as specified in Section "Cast in Place Repair Mortar."

C. Execution

1. Contractor shall remove existing expansion materials in manner that minimizes damage to adjacent concrete. Alterations to existing expansion joint blockout required for installation of new expansion joint system shall be performed in accordance with Work Item "Expansion Joint Preparation – Repair Concrete Wash and Blockout" and Section "Surface Preparation for Patching."
2. Contractor shall locate and mark wash installation areas as located on Drawings.
3. All sound and unsound concrete shall be removed from within marked boundaries by sawcutting and chipping to sufficient width and depth as described in Detail 9.2LR. Caution shall be exercised during sawcutting operations to avoid damaging existing reinforcement near surface of concrete.
4. Spalls and delaminations located within wash area shall be patched in accordance with "Concrete Floor Repair."
5. Repair materials and associated reference specifications are listed in Work Item "Expansion Joint Preparation – Repair Concrete Wash and Blockout," Article "Materials" above. Repair installation procedures shall be in accordance with referenced specifications for selected material.

WI 10.0 EXPANSION JOINT REPAIR AND REPLACEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing expansion joints, prepare adjacent concrete and furnish and install new expansion joint system. Refer to Detail Series 10.0 for specific requirements.

B. Materials

1. Expansion joint system materials shall be as specified in Section "Expansion Joints System," installed in strict accordance with manufacturer's recommendations.
2. Concrete repair materials shall be as specified in Section "Cast-in-Place Repair Mortar."
3. Trowel applied material shall be as specified in Section "Trowel Applied Mortar."

C. Execution

1. Contractor shall remove existing expansion materials in manner that minimizes damage to adjacent concrete. Alterations to existing expansion joint blockout required for installation of new expansion joint system shall be performed in accordance with Work Item "Floor Repair - Provide Expansion Joint Blockout" and Section "Surface Preparation for Patching."
2. Joint materials and associated reference specifications are listed in Work Item "Expansion Joint Repair and Replacement," Article "Materials," above. Joint installation procedures shall be in accordance with referenced specifications and manufacturer's recommendations.
3. In-place testing: Prior to opening to traffic, test joint seal for leaks with 2 in. water depth maintained continuously for 12 hrs. Repair leaks revealed by examination of seal underside. Repeat test and repairs until all leaks stopped for full 12 hrs.

WI 10.3LR EXPANSION JOINT – ELASTOMERIC CONCRETE EDGED

- A. Refer to Work Item "Expansion Joint Repair and Replacement" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 10.3LR for specific requirements.

WI 10.3LL EXPANSION JOINT – ELASTOMERIC CONCRETE EDGED

- A. Refer to Work Item "Expansion Joint Repair and Replacement" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 10.3LL for specific requirements.

WI 10.5LR EXPANSION JOINT – ADHERED VERTICAL

- A. Refer to Work Item "Expansion Joint Repair and Replacement" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 10.5LR for specific requirements.

WI 11.0 CRACK AND JOINT REPAIR

WI 11.1 SEAL CRACKS AND JOINTS

- A. Scope of Work
 - 1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, prepare and seal random cracks and unsealed construction joints in concrete floor and/or topping. Refer to Detail 11.1 for specific requirements.
- B. Materials
 - 1. Approved materials for use in this Work are specified in Section "Concrete Joint Sealants."
- C. Execution
 - 1. Contractor shall thoroughly clean and inspect concrete slabs and/or topping for cracks and unsealed construction joints. Those identified as either greater than 0.03 in. wide or showing evidence of water and/or salt staining on ceiling below shall be sealed. All cracks and joints identified for repair shall be marked with chalk to aid in precision routing. Obtain depths to top reinforcing bars and post-tensioning tendons in area of repair by use of a pachometer. Determine depth of electrical conduit (metal or plastic). Do not exceed this depth of routing where the crack to be repaired crosses the embedded items. Damage to embedded items will require repair or replacement at no cost to the Owner.

2. Cracks and construction joints shall be ground or sawcut to an adequate width and depth as required by Work Item Detail. Routing shall be performed by mechanized device that has positive mechanical control over depth and alignment of cut. Hand held power grinders with abrasive disks shall not be used on control/construction joints, but may be used on random cracks.
3. Cavities shall be thoroughly cleaned by either sandblasting or grinding to remove all laitance, unsound concrete and curing compounds which may interfere with adhesion. Groove shall be air blasted to remove remaining debris.
4. Sealant materials and associated reference specifications are listed in Work Item "Seal Cracks and Construction Joints," Article "Materials," above. Sealant installation procedures shall be in accordance with referenced specifications for selected material.
5. Traffic topping manufacturer shall specify joint sealant type compatible with traffic topping. Crack and joint sealant work shall be incidental to traffic topping system.

WI 11.2LL REPLACE JOINT SEALANT IN PRECAST FLOOR SYSTEM

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove all existing sealant, prepare edges and install new sealant in the precast concrete floor system. Refer to Detail 11.2LL for specific requirements.

B. Materials

1. Approved materials for use in this Work are specified in Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall remove existing sealant from joints.
2. When existing joint dimensions do not conform to Detail 11.2LL, joints shall be routed or sawcut to an adequate width and depth as required by Work Item Detail. Routing shall be performed by mechanized device that has positive mechanical control over depth and alignment of cut.
3. Cavities shall be thoroughly cleaned by either sandblasting or grinding to remove all remaining sealant and unsound concrete which may interfere with adhesion. Groove shall also be air blasted to remove remaining debris.
4. Install sealants in accordance with sealant manufacturer's instructions and the specification Section "Concrete Joint Sealants."

WI 11.3LL REPLACE CRACK/JOINT SEALANT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate and mark failed joint sealant, remove existing sealant, prepare edges and reseal joints and cracks. Refer to Detail 11.3LL for specific requirements.

B. Materials

1. Approved materials for use in this Work are specified in Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall locate failed crack/joint sealant by visual inspection.
2. Contractor shall remove existing sealant from joints and/or cracks.
3. When existing joint dimensions do not conform to Detail 11.2, joints shall be routed or sawcut to an adequate width and depth as required by Work Item Detail. Routing shall be performed by mechanized device that has positive mechanical control over depth and alignment of cut.
4. Cavities shall be thoroughly cleaned by either sandblasting or grinding to remove all remaining sealant and unsound concrete which may interfere with adhesion. Groove shall also be air blasted to remove remaining debris.
5. Install sealants in accordance with sealant manufacturer's instructions and the specification Section "Joint Sealants."
6. Traffic topping manufacturer shall specify joint sealant type compatible with traffic topping. Crack and joint sealant work shall be incidental to traffic topping system.

WI 11.4 TOOL AND SEAL PATCH PERIMETERS

A. Scope of Work

1. Work consists of providing all labor, materials, equipment, supervision and incidentals necessary to provide tooled and sealed joints in floor patch perimeters as shown on Drawings. Refer to Detail 11.4 for specific requirements.

B. Materials

1. Sealant materials shall be as specified in Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall locate and provide tooled joints at all floor patch perimeters and at all existing control and construction joints.
2. Joints shall be tooled and formed in plastic concrete. Sawcutting joints after concrete sets will not be allowed.
3. Tooled joints shall be of proper dimension in plastic concrete.
4. Approved joint materials shall be installed as specified in referenced specification section listed in Work Item "Tool and Seal Patch Perimeters," Article "Materials."

WI 11.5 TOOL AND SEAL CONTROL JOINTS

A. Scope of Work

1. Work consists of providing all labor, materials, equipment, supervision and incidentals necessary to provide sealed control joints in concrete overlay as shown on Drawings. Refer to Detail 11.5 for specific requirements.

D. Materials

1. Sealant materials shall be as specified in Section "Concrete Joint Sealants."

E. Execution

1. Contractor shall locate and provide control joints at all column grid lines and at all existing control and construction joints.
2. Control joints shall be tooled and formed in plastic concrete. Sawcutting joints after concrete sets will not be allowed.
3. Tooled joints shall be of proper dimension in plastic concrete.
4. Approved joint materials shall be installed as specified in referenced specification section listed in Work Item "Overlay Control Joint System," Article "Materials."

WI 11.7 COVE SEALANT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare concrete surfaces and install cove sealant between floor and vertical surfaces as shown on Drawings. Refer to Detail 11.7 for specific requirements.
2. Where traffic topping is being installed this work is incidental and the cost shall be included in the cost of the traffic topping.

B. Materials

1. Joint sealant materials shall be as specified in Section "Concrete Joint Sealants."
2. Joint sealant material shall be compatible with traffic topping materials specified in Section "Traffic Coatings."

C. Execution

1. Wall-floor intersection to be sealed shall be thoroughly cleaned by sandblasting to remove all contaminants and foreign material.
2. Entire Work area shall then be cleaned with compressed air to assure that all loose particles have been removed and that intersection is dry.
3. Properly prepared intersection shall be coated evenly and completely with joint primer material on each of intersecting faces in accordance with sealant manufacturer's recommendations.

4. After primer has cured, apply cove sealant to intersection such that sealant extends 0.75 in. onto each of intersecting faces.
5. Work cove sealant into joint so that all air is removed and tool to concave shape such that minimum throat dimension of no less than 0.5 in. is maintained.
6. Remove excess sealant and allow to cure.
7. Apply coating on horizontal and vertical surfaces where shown on Drawings in even layers in strict accordance with manufacturer's recommendations. Sealant material and associated reference specifications are listed in Work Item "Cove Sealant," Article "Materials," above for traffic topping coating materials and installation requirements.

WI 12.0 BITUMINOUS / ASPHALT REPAIR

WI 12.1 BITUMINOUS ASPHALT PATCHING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and bituminous asphalt, associated concrete, aggregate base material, and soils related to the Work Item. Refer to Detail Series 12.1 for specific requirements.

B. Materials

1. Bituminous asphalt, aggregate base/subbase materials shall be as specified in Division 32 Section "Asphalt Paving."

C. Execution

1. Contractor shall locate and mark all Work areas as specified in Division 32 Section "Asphalt Paving".
2. The Work shall be completed in accordance with Section "Asphalt Paving."
3. Excavations shall be protected from traffic, vibration, loading, and weather related conditions until such time as the Work is complete.

WI 15.0 PROTECTIVE SEALER

A. Scope of Work

1. Work consists of providing all labor, materials, equipment, supervision and incidentals necessary to prepare surfaces and install protective sealer system on concrete surfaces exposed to vehicular and/or pedestrian traffic.

B. Materials

1. Protective sealer system materials shall be as specified in Section "Water Repellents."

C. Execution

1. All surfaces scheduled to receive protective sealer system shall be identified by Contractor.
2. Floor surfaces shall be prepared by shotblast in accordance with Section "Water Repellents."
3. All other surfaces to be treated shall be brushed, waterblasted, or sandblasted as required and then airblasted prior to application. Use of waterblasting on vertical or overhead surfaces requires adequate drying time before application to achieve proper penetration.
4. Sealer application shall be as specified in referenced specification section listed in Work Item "Protective Sealer," Article "Materials," above. Overhead and vertical surface application shall be by brush or pressure sprayer.

WI 15.1LR CONCRETE SEALER - FLOORS

- A. Refer to Work Item "Protective Sealer" for scope of Work, materials and procedure associated with this Work Item.

WI 16.0 TRAFFIC TOPPING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals, including installation of joint sealant materials, necessary to prepare existing floor surface and install traffic topping as shown on Detail 16.1 and Drawings. Coating of all vertical surfaces within Work area shall be incidental to installation of traffic topping.

B. Materials

1. Approved materials for use in this Work are as specified in Section "Traffic Coatings."

C. Execution

1. Floor surface preparation shall be performed by coating system applicator or under its direct supervision. Shotblast surface preparation is required for floors.
2. Traffic topping shall be installed by licensed applicators in strict accordance with manufacturer's recommendations and referenced specification section listed in Work Item "Traffic Topping," Article "Materials," above. Crack preparation, including installation of joint sealant material where required, is incidental to traffic topping work.
3. Coating system shall be thoroughly cured prior to Work areas being returned to service.

WI 16.1 TRAFFIC TOPPING - VEHICULAR

- A. Refer to Work Item "Traffic Topping" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 16.1 for specific requirements.

WI 16.8LR TRAFFIC TOPPING – STEEP RAMPS

- A. Scope of Work
1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals, including installation of joint sealant materials, necessary to prepare existing floor surface and install traffic topping as shown on Detail 16.8 and Drawings. Coating of all vertical surfaces within Work area shall be incidental to installation of traffic topping.
- B. Materials
1. Approved materials for use in this Work are as specified in Section "Traffic Coatings."
- C. Execution
1. Floor surface preparation shall be performed by coating system applicator or under its direct supervision. Shotblast surface preparation is required for floors.

WI 21.0LR P/T SYSTEM REPAIR – MONOSTRAND

- A. Scope of Work
1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to make P/T tendon splice repairs and P/T end anchorage repairs to the monostrand post-tensioning system. Refer to Detail series 21.0 for specific requirements. Refer to Section "Unbonded Post-Tensioned Concrete" for further requirements.
 2. The furnishing and installing of reinforcing steel as shown on the Details is incidental to this work. Concrete removals and replacement is not included in this work and shall be performed and paid for under Work Item series WI 3.0 or WI 4.0 as applicable.
- B. Materials
1. Post-Tensioning materials and related materials shall be as specified in Section "Unbonded Post-Tensioned Concrete".
 2. Reinforcing steel shall be epoxy coated as specified in Section "Cast-in-Place Concrete".
 3. Epoxy adhesive for reinforcing dowels shall be Hilti HY-150.
- C. Prequalified Installers:

1. Refer to Section "Unbonded Post-Tensioned Concrete".

D. Prequalified Suppliers:

1. Refer to Section "Unbonded Post-Tensioned Concrete".

E. Execution

1. Prior to concrete removals, submit shoring and bracing plan for engineer review. Engineer review does not absolve contractor's total responsibility for providing the necessary shoring and bracing to maintain the stability of the structure and individual elements.
2. Refer to Work Item series 21.0 and "P/T General Notes" on drawings for additional requirements.
3. Below is a general procedure for P/T tendon repairs. The actual repair procedure for each repair location may vary depending on existing conditions and shall be reviewed by the Engineer. Contractor shall coordinate with Engineer.
 - a. Locate damaged tendon, measure and record length between anchor points.
 - b. Measure and record cable separation, failure point and offset from nearest column face. Mark adjacent floor slab beyond concrete removal boundary to reference the failed tendon end points.
 - c. Mark cable path on floor surface between anchors with marking paint.
 - d. Inspect floor slab top and bottom for cracks, delaminations, and spalls.
 - e. Remove all unsound and delaminated concrete only from floor and ceiling surfaces along tendon patch (see item 1 above).
 - 1) Closely inspect the exposed tendon for damage at all concrete removal sites. If no damage is observed, proceed to step F. If damage is observed, comply with step 2 below.
 - 2) Mark all damaged points for inspection by Engineer. Do not proceed with further concrete removals until after Engineer's inspection and approval.
 - f. As directed by the Engineer, perform full depth removal at tendon anchorage to expose only the nonstressed side of the anchor plate. Excavate the anchorage nearest the failure point first then, excavate the opposite end. Inspect the anchorage for damage. Note that the tendon will probably retain some residual stress from corrosion lock up at the tendon high points. Continue to use extra caution during concrete removals.
 - g. Coordinate inspection of end anchors by Engineer.
 - h. As directed by the Engineer, continue partial concrete removals at tendon high points adjacent to the tendon failure locations. Removal should begin at the high point (closest to the failure) and work successively towards the nearest exposed anchor. Perform removals a safe distance away from end anchors and intermediate anchors. Perform removals so as to systematically detension and free up each tendon in small sections between removal points. The Engineer may direct termination of concrete

removals if exposed tendons are found to be relaxed and free of corrosion. Cease removals as the Engineer directs, or when damaged tendon is released along its entire length.

- i. Perform remaining concrete removals both partial and full depth to accommodate tendon splicing and new end anchor installation.
- j. Engineer will determine location, type and extent of tendon repair.
- k. Install splice couplings, end anchors, sheathing, new tendons and reinforcing steel per the applicable Work Item and in accordance with Section "Unbonded Post-Tensioned Concrete". Cleaning and epoxy coating of all exposed reinforcing steel and P/T materials is incidental to concrete work.
- l. Install patch concrete both partial and full depth at all locations except at stressing pockets and splice couplings. Concrete work shall be performed and paid for under Work Item series 3.0 or 4.0 as applicable.
- m. Stress tendon when concrete has achieved 75 percent of required 28-day compression strength. Do not trim tendons until Engineer has approved stressing logs. Additional stressing shall be performed as required by Engineer and is incidental to the work.
- n. Install patch concrete at stressing pocket and splice coupling locations.
- o. Refer to Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.2LR PROTECT EXPOSED P/T TENDON(S)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove damaged tendon sheathing, re-grease (or epoxy coat tendons as approved by Engineer) in damaged area and install new sheathing. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail 21.20 for specific requirements.

B. Materials

1. Refer to Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Remove damaged sheathing materials from exposed tendon.
2. Grease coating:
 - a. Apply additional corrosion-inhibiting grease over the damaged area to completely fill any void or surface depression caused by the sheathing damage.
3. Epoxy coating option (use only as approved by Engineer).
 - a. Clean tendon to remove grease residue from exposed tendon.
 - b. Apply uniform coating of epoxy to exposed tendon.

4. Install split sheathing over exposed tendon. Sheathing shall overlap existing sheathing by at least two inches at each end. Sheathing shall be oriented such that the split is toward the bottom.
5. Tape entire length of repair, spirally wrapping tape around sheathing to provide at least two layers of tape. Taping shall overlap existing sheathing by 2 in. at each end.

WI 21.3LR P/T TENDON ANCHORAGE (LIVE)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing tendon anchorage system, install new reinforcement, install new tendon anchorage system, and re-tension tendon to required stresses. Concrete repair work is not part of this Work Item. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.3 for specific requirements.

B. Materials

1. Refer to WI 21.0 "P/T System Repair Monostrand", Article "Materials" and Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Detension any remaining wires in tendons designated for repair. Remove existing end anchorage system.
2. Install new plastic-coated steel end anchor and install epoxy coated reinforcement as shown in Details at stressing side of end anchor.
3. Grease and wrap new or existing tendon at end anchor repair area in accordance with WI 21.2 and is incidental to this work.
4. Place concrete at stressing side of end anchor. After concrete has reached specified strength, tension tendon to specified stresses and lock off. Restressing due to tendon lock-up or additional tendon failures during stressing is incidental to this work.
5. After engineer has approved stressing records, install epoxy coated reinforcement and place concrete at non-stressing side of end anchor.
6. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.4LR P/T TENDON END ANCHORAGE (DEAD)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing tendon anchorage system, install reinforcement, and install new tendon anchorage system. Stressing of the tendon is not part of this work but will occur at a different location along the tendon per WI 21.3, WI 21.5 or WI 21.6. Concrete work performed in

association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.4 for specific requirements.

B. Materials

1. Refer to WI 21.0 "P/T System Repair Monstrand", Article "Materials" and Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Detension any remaining wires in tendons designated for repair. Remove existing end anchor.
2. Install new plastic-coated end anchor and install epoxy coated reinforcement as shown in Decrials.
3. Grease and wrap new or existing tendon at end anchor repair area in accordance with WI 21.2 and is incidental to this work.
4. Place concrete in repair area. After concrete has reached specified strength, tension tendon to specified stresses. Stressing operations is not included in WI 21.4.
5. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.5LR P/T TENDON END ANCHORAGE @ POURSTRIP

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing tendon anchorage system, install new reinforcement, install new tendon anchorage system, and re-tension tendon to required stresses. Concrete repair work is not part of this Work Item. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.5 for specific requirements.

B. Materials

1. Refer to WI 21.0 "P/T System Repair Monostrand", Article "Materials" and Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Detension any remaining wires in tendons designated for repair. Remove existing end anchorage system.
2. Install new plastic-coated steel end anchor and install epoxy coated reinforcement as shown in Details at stressing side of end anchor.
3. Grease and wrap new or existing tendon at end anchor repair area in accordance with WI 21.2 and is incidental to this work.
4. Place concrete at stressing side of end anchor. After concrete has reached specified strength, tension tendon to specified stresses and lock off. Restressing due to tendon lock-up or additional tendon failures during stressing is incidental to this work.

5. After engineer has approved stressing records, install epoxy coated reinforcement and place concrete at non-stressing side of end anchor.
6. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.6LR TENDON SPLICE COUPLING (CENTER-PULL)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install a center-pull splice coupling for splicing and stressing of a tendon. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.6 for specific requirements.

B. Materials

1. Refer to Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Detension any remaining wires in tendons designated for repair.
2. Install center-pull splice coupling onto tendon with required overlap/extension and then stress tendon to specified stress. If this Work Item is performed in combination with other P/T repairs along same tendon, then stress tendon after concrete anchor blocks and patches have achieved the specified compressive strength. Refer to Detail series 21.6 for specific requirements.
3. Epoxy coat coupling prior to installation of repair concrete.
4. Grease and wrap new and existing tendons in repair area in accordance with WI 21.2 and is incidental to this work.
5. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" or additional requirements.

WI 21.7LR TENDON SPLICE COUPLING (SINGLE)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install one tendon splice coupling and a length of new P/T tendon as Detailed. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.7 for specific requirements. This work is performed in conjunction with either WI 21.3, WI 21.5 or WI 21.6.

B. Materials

1. Refer to Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Install new splice coupling assembly onto unstressed existing tendon. Extend the new tendon to the stressing location. If tendon splice length is greater than that indicated on Detail, then Contractor shall be paid for additional length of Tendon per WI 21.9.
2. Epoxy coat all exposed splice coupling assembly prior to installation of repair concrete.
3. Grease and wrap new existing tendon at tendon splice repair area in accordance with WI 21.2 and is incidental to this work.
4. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.8LR TENDON SPLICE COUPLING (DOUBLE)

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install two tendon splice couplings and a length of new P/T tendon as Detailed. Concrete work performed in association with this work will be paid separately under Work Item series 3.0. Refer to Detail series 21.8 for specific requirements. This work is performed in conjunction with either WI 21.3, 21.5 or 21.6.

B. Materials

1. Refer to Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Install new splice couplings onto unstressed existing tendons and connect to new tendon. If tendon splice length is greater than that indicated on Detail, then Contractor shall be paid for additional length of Tendon per WI 21.9.
2. Epoxy coat all exposed splice couplings prior to installation of repair concrete.
3. Grease and wrap new existing tendon at tendon splice repair area in accordance with WI 21.2 and is incidental to this work.
4. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.9LR P/T TENDON MATERIAL

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to provide and install new P/T monostrand tendon in Work Items 21.7 and 21.8 where splice lengths are greater than that indicated on Details.

B. Materials

1. Refer to Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Install new tendon within concrete removal area as needed to replace damaged or defective tendon.
2. Tendon profile shall match existing. Use chairs and tie wire to maintain Tendon position during concrete placement.
3. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.10LR REPLACE EMBEDDED P/T TENDON

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing tendon embedded in concrete, provide and install new P/T monostrand tendon within existing embedded sheath. Concrete work performed in association with this work will be paid separately under Work Item series 3.0.

B. Materials

1. Refer to Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Remove existing tendon and install new tendon as needed to replace damaged or defective tendon as directed by Engineer. Typically, this work will occur at tendons with multiple breaks.
2. Fully grease tendon prior to installation.
3. Refer to WI 21.0 and Section "Unbonded Post-Tensioned Concrete" for additional requirements.

WI 21.11LR TEMPORARY TENDON ANCHOR

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to install a temporary anchor plate assembly in lieu of detensioning. Refer to Detail 21.11.0 for specific requirements.

B. Materials

1. Refer to Section "Unbonded Post-Tensioned Concrete".

C. Execution

1. Refer to Detail 21.11.0.

WI 25.0 MECHANICAL – DRAINAGE

WI 25.2 MECHANICAL – FLOOR DRAIN REPLACEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to replace existing deteriorated floor drains as shown on the drawings. Work Item "Pipe and Hangers" is directly related to this Work Item. Refer to Detail 25.2 for specific requirements.
2. General Contractor responsible for demolition, removal of drain and placing new concrete. General Contractor to be paid for this work under Work Item Series 3.0 or 8.0.

B. Materials

1. Approved materials for this Work are as shown on Detail 25.2 and in Section "Common Work Results for Plumbing" and "Facility Storm Drainage Piping."
2. Sealant materials shall be as specified in Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall locate and mark all floor drains scheduled to be replaced, which will then be verified by the Engineer.
2. Concrete preparation shall be as shown on Detail 25.2.
3. Drains shall be installed as shown on Detail 25.2.

WI 25.3 MECHANICAL - PIPE AND HANGERS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to replace exiting deteriorated piping or install pipe and hangers for supplemental or replacement drains. Refer to Detail 25.3 for specific requirements.

B. Materials

1. Approved materials for this Work are as shown on Detail 25.3 and in Section "Common Work Results for Plumbing" and "Facility Storm Drainage Piping."

C. Execution

1. Contractor shall locate and mark all areas where floor drain piping is to be installed.
2. Pipes and hangers shall be installed as shown on Detail 25.3 and in accordance with referenced specification section listed in Work Item "Pipe and Hangers," Article "Materials," above.

WI 25.4 MECHANICAL - SUPPLEMENTARY FLOOR DRAINS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to supplement existing floor drain system by installing additional drains. Work Item "Pipe and Hangers" is directly related to this Work Item. Refer to Detail 25.4 for specific requirements.
2. General Contractor responsible for demolition, and placing new concrete. General Contractor to be paid for this work under Work Item Series 3.0 or 8.0.

B. Materials

1. Approved materials for this Work are as shown on Detail 25.4 and in Section "Common Work Results for Plumbing" and "Facility Storm Drainage Piping."
2. Sealant materials shall be as specified in Section "Concrete Joint Sealants."

C. Execution

1. Contractor shall locate and mark all areas where supplemental floor drains are to be installed.
2. Contractor shall verify low points on slab by ponding or elevation survey prior to locating drains.
3. For post-tensioned concrete construction and in areas noted by Engineer/Architect, set drain location and core drain opening only after verification of clear site by non-destructive testing.
4. Concrete preparation shall be as shown on Detail 25.4.
5. Drains shall be installed as shown on Detail 25.4.

WI 25.6 MECHANICAL – CLEAN EXISTING DRAINS, PIPING & OIL/SAND SEPARATOR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to clean drains, collectors/pits, and piping in the garage for adequate drainage.

B. Materials: None specified.

C. Execution

1. Work shall commence after all concrete operations that leave slurry or similar debris in or near drains.
2. Clean and flush all drains within parking structure to remove debris buildup and accumulation, to include collector/pit areas.
3. All drains within the parking structure shall be kept free-flowing throughout the duration of the project. Work shall also include replacement of any damaged drain grates.
4. Equipment shall be equal to or better than 4000 psi water jet flusher with no less than 15 gpm at nozzle end.
5. To insure the proper cleaning of the lines and adequate footage is being cleaned, a daily log shall be filled out to show the amount of progress and amount of debris each day, which shall be turned in daily to the Engineer. Contractor will be required to provide a written summary of all drain locations, date each drain and drain line cleaned and tested, verifications or proper flow upon completion of construction for each parking structure. Contractor shall provide sample format of report for approval by the Engineer prior to performing Work.

WI 26.0 MECHANICAL – FIRE PROTECTION

WI 26.1LR MECHANICAL – DEMOLISH & REPLACE FIRE STANDPIPE SYSTEM, LEO A. ROY GARAGE

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing standpipe system and provide and install a new standpipe system in the Leo Roy Parking Garage in accordance with FPO, FPD and FP series drawings.

WI 26.2LL MECHANICAL – DEMOLISH & REPLACE FIRE STANDPIPE SYSTEM, LOWER LOCKS GARAGE

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing standpipe system and provide and install a new standpipe system in the Lower Locks Parking Garage in accordance with FPO, FPD and FP series drawings.

WI 34.0 ELECTRICAL – FIRE ALARM

WI 34.1LR ELECTRICAL – FIRE ALARM SYSTEM REPLACEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing fire alarm system and provide and install a new fire alarm system in the Leo Roy Parking Garage in accordance with Drawings FA0.00, FA1.00, FA1.01, and FAD1.00. Furnish all labor, materials, supervisions and incidentals necessary to modify the fire alarm

system at the Lower Locks Parking Garage in accordance with Drawings FA0.00 and FA2.00.

WI 34.2LL ELECTRICAL – FIRE ALARM MODIFICATIONS

A. Scope of Work

2. Work consists of furnishing all labor, materials, supervisions and incidentals necessary to modify the fire alarm system at the Lower Locks Parking Garage in accordance with Drawings FA0.00 and FA2.00.

WI 35.0 BRICK / MASONRY REPAIRS

WI 35.1 TUCKPOINTING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to tuckpoint defective, cracked, broken or eroded joints in existing brick work, and side vertical joints and top masonry joint where new brick abuts existing. Refer to detail 35.1 for specific requirements.

B. Materials

1. Approved materials for this work shall be as specified in Section "Maintenance of Unit Masonry."

C. Execution

1. Contractor shall locate and mark all Work areas. Engineer/Architect shall verify locations prior to start of Work.
2. All defective joints which are cracked, broken, or eroded to depth of 0.5 in. or more, and all vertical side joints and top masonry joints where new brick abuts existing shall be tuckpointed.
3. Joints to be tuckpointed shall be cut back to depth of 0.75 in., or to full depth of deterioration. Use mechanically operated blades only to perform cutting. Joint at back of cut shall have square shoulder. Remove all mortar from upper and lower surfaces and sides of mortar joint being prepared.
4. Contractor shall flush all mortar joints thoroughly with clean water under pressure prior to tuckpointing to remove all dust, dirt, and laitance. Brick shall be damp and free of excess water before tuckpointing commences. Take all necessary precautions to prevent water from entering cavity space during cleaning operations.
5. Tuckpointing shall be performed using Type N mortar in accordance with Section "Maintenance of Unit Masonry" unless otherwise directed by Engineer. Match existing mortar color. Mortar shall be dry and mixed thoroughly prior to adding water. Add one-half required mixing water and allow to stand 1 hour, then add balance of mixing water.

6. Press mortar into prepared joint using pointing tool 0.125 in. smaller than width of joint until joint is packed full. Finish point joint with pointing tool at least 0.125 in. wider than prepared joint.
7. Prior to initial set of mortar, tool joints to match existing.
8. Allow 3 to 7 days for mortar to harden prior to cleaning of brick wall.
9. Dispose of all accumulated material and leave premises in clean condition.
10. Masonry surfaces that become dirty or smeared during joint cutting and repointing of joint surfaces shall be cleaned with bristle brushes and plain water.
11. Unnecessary damage to surrounding brick shall be repaired by Contractor at no cost to Owner.

WI 35.2 BRICK MASONRY UNIT REPLACEMENT

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary for local brick removal and replacement due to fractures, cracks, broken or unsound brick. Refer to detail 35.2 for specific requirements.

B. Materials

1. Brick shall be as specified in Section "Unit Masonry."
2. Mortar shall be as specified in Section "Unit Masonry."

C. Execution

1. Contractor shall locate and mark all brick to be replaced. Engineer/Architect shall verify replacement locations prior to start of Work.
2. Contractor shall remove all existing fractured, cracked, spalled, broken or structurally unsound brick and all brick damaged during removal and toothing work.
3. Internal structural steel exposed during removal process shall be sandblasted to bare metal coated with high performance coating. Coat with one coat of corrosion resistant paint prior to brick replacement.
4. Entire cavity of removed brick shall be thoroughly cleaned of all mortar from top, bottom, and both sides of all brick that abut new brick work. Do not allow mortar droppings to accumulate in cavity space, in weep holes, or on flashing. Engineer/Architect shall inspect all cavities for condition prior to commencement of new construction.
5. New brick veneer shall be anchored to backing with flexible metal ties embedded in masonry joints and attached to existing structure. Space veneer anchors at 16 in. o.c. vertically. Horizontal anchor spacing shall not exceed 24 in. o.c. Existing veneer anchors not damaged during brick removal may be reused at Contractor's option. Clean existing anchors prior to replacing brick veneer.
6. Flush cavity thoroughly with water to remove all dust and laitance prior to brick replacement. Take all necessary precautions to prevent water from entering cavity space during cleaning operations. Allow excess water to run off. New brick or existing brick removed from building shall be laid in full bed of mortar while wall is still damp. All brick repair work shall be flush with existing.

7. New brick work is to be toothed into existing brick work.
8. Side vertical joints and top masonry joint shall be tuckpointed per other Work Items.
9. Prior to initial set of mortar, tool joints to match existing.
10. Adequate weather protection shall be installed over all areas left open at completion of each day's work.
11. Allow 3 to 7 days for mortar to harden prior to cleaning of brick wall.
12. Dispose of all accumulated material and leave premises in clean condition.
13. Masonry surfaces that become dirty or smeared during joint cutting and repointing of joint surfaces shall be cleaned with bristle brushes and plain water.
14. Unnecessary damage to surrounding brick shall be repaired by Contractor at no cost to Owner.

WI 35.3LL CAPSTONE REPLACEMENT

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to provide new precast concrete cap stone, clean top of masonry, fill cells with grout, and reinstall capstones on proper mortar bed. Refer to Detail 35.3LL for specific requirements.

B. Materials

1. Mortar shall be as specified in Section "Unit Masonry."
2. Sealant for pointing capstones shall be as specified in Section "Architectural Joint Sealants."
3. Capstones to match existing.

C. Execution

1. Contractor to clean the exposed top of CMU of all growth, dirt, and other deleterious matter. Fill cells of CMU with grout as required to create level surface for capstone installation.
2. Reset capstones on top of continuous bed of mortar.
3. Point capstone joints with sealant.

WI 35.4 CAPSTONE JOINT REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate existing capstone joints, remove existing flexible joint sealant material and backer rod (as required), prepare substrate and install flexible joint sealant material (including backer rod and bond breaker where indicated). Refer to Detail 35.4 for specific requirements.

B. Materials

1. Backer rods, sealants and bond breaker tape shall be as specified in Section "Architectural Joint Sealants."

C. Execution

1. Contractor shall locate and mark all joints requiring replacement or new sealant as detailed on Drawings.
2. Contractor shall remove existing joint sealant and backer rod. Care shall be taken not to damage adjacent masonry or architectural features.
3. Joint shall be thoroughly cleaned by grinding to remove all mortar, residual joint filler material, joint sealant material, and unsound capstone material for depth of new joint sealant. Joint shall be airblasted to remove remaining debris.
4. Unnecessary damage to surrounding wall assembly shall be repaired by Contractor at no cost to Owner.
5. Contractor shall install new joint sealant in accordance with Details and Section "Architectural Joint Sealants."
6. Adjoining masonry surfaces on both sides of joint shall be covered with tape prior to sealing joint. Remove tape upon completion of sealing control joint.
7. Sealed joints shall be neat in appearance. Poorly sealed or improperly sealed control joints shall be removed and replaced at Contractor's expense.

WI 35.5 CONCRETE MASONRY UNIT REPLACEMENT

- A. Refer to Work Item "Brick Masonry Unit Replacement" for scope of Work, materials and procedure associated with this Work Item. Refer to Detail 35.5 for specific requirements.

WI 35.6 CAPSTONE FLASHING AND RESETTING

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove exiting capstone and mortar bed, clean masonry, install wall flashing on top of parapet wall and reinstall capstones on proper mortar bed. Refer to Detail 35.6LL for specific requirements.

B. Materials

1. Flashing shall be as specified in Section "Unit Masonry."
2. Mortar shall be as specified in Section "Unit Masonry" and/or Section "Maintenance of Unit Masonry."
3. Sealant for pointing shall be as specified in Section "Architectural Joint Sealants."

C. Execution

1. Contractor shall remove capstones and store in an area that will protect them from damage during construction operations. Contractor shall be responsible for repairing or replacing capstones damaged during construction to Owner's satisfaction.
2. Capstone removal/resetting and other applicable repair work items shall be performed at and around parapet locations prior to flashing installation.
3. Contractor shall, with direction of engineer, inspect the existing anchors located below the existing capstones for adequate capacity.
4. If supplemental anchors are required, install as directed by Engineer.
5. Install new through wall flashing on a continuous bed of mortar. Extend flashing $\frac{1}{2}$ " past face at wall – each side
6. Reset capstones on top of through wall flashing with continuous bed of mortar.
7. Finished installation shall be a physically stable capstone, anchored to the parapet wall through the interlocking flashing pattern and the mortar bed.
8. Flashing shall be continuous, and lap joints in individual flashing sections shall be fabricated and used so continuous flashing is water tight.

WI 35.7LL CAPSTONE RESETTING AND POINTING

A. Scope of Work

1. This work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove exiting capstone and mortar bed, clean masonry, and reinstall capstones on proper mortar bed. Refer to Detail 35.7LL for specific requirements.

B. Materials

1. Mortar shall be as specified in Section "Unit Masonry" and/or Section "Maintenance of Unit Masonry."
2. Grout shall be as specified in Section "Unit Masonry."
3. Sealant for pointing shall be as specified in Section "Architectural Joint Sealants."

C. Execution

1. Contractor shall remove capstones and store in an area that will protect them from damage during construction operations. Contractor shall be responsible for repairing or replacing capstones damaged during construction to Owner's satisfaction.
2. Capstone removal/resetting and other applicable repair work items shall be performed at and around parapet locations prior to flashing installation.
3. For typical conditions, new stone anchors below capstones will have been installed incidental to other stone repair work items.
4. Contractor shall, with direction of engineer, inspect the existing anchors located below the existing capstones for adequate capacity.
5. If supplemental anchors are required, install as directed by Engineer.
6. Install new through wall flashing on a continuous bed of mortar. Extend flashing $\frac{1}{2}$ " past face at wall – each side

7. Reset capstones on top of through wall flashing with continuous bed of mortar.
8. Finished installation shall be a physically stable capstone, anchored to the parapet wall through the interlocking flashing pattern and the mortar bed.
9. Flashing shall be continuous, and lap joints in individual flashing sections shall be fabricated and used so continuous flashing is water tight.

WI 35.8LL CONCRETE MASONRY UNIT SOAP REPAIR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove damaged portions of existing CMU, and tie in replacement soap to match existing CMU. Refer to Detail 35.8LL for specific requirements

B. Materials

1. CMU shall be as specified in Section "Unit Masonry."
2. Other repair materials shall be as specified in Section "Maintenance of Unit Masonry".

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all CMU locations for soap repairs.
2. Damaged sections of existing CMU shall be removed by saw cutting to form clean boundaries between adjacent CMU. Do not cut past removal area at interior corners of repair area. CMU shall be demolished to a depth of +/-2" using electric chipping hammers or other means that will prevent damage to the full depth of the block.
3. All soap repairs shall be mechanically anchored to the adjacent CMU.
4. Interface between soap shall be fully bedded in mortar/adhesive.. Remove all excess material immediately from face of stone and rinse with clean water.
5. After installation is complete, clean all debris, dirt and mortar from repair area to match appearance of surrounding stone.

WI 37.0 DOORS, FRAMES AND HARDWARE

WI 37.1 REMOVE AND REPLACE DOOR & FRAME

A. Scope of Work

1. Work Consists of labor, materials, equipment, supervision, and incidentals to locate, remove and dispose of the existing steel doors and frames , prepare the openings, and install new steel doors assemblies. Refer to drawings for additional requirements and location of work under this item.

B. Materials

1. Materials as specified in sections "Hollow Metal Door & Frames" & "Door Hardware".
2. Sealant materials shall be as specified in Section "Architectural Joint Sealants".
3. Painting materials shall be as specified in Section "Exterior Painting".

C. Execution

1. Contractor shall locate and mark work locations prior to start of work. Engineer shall verify locations.
2. Contractor shall remove the existing door assemblies at locations shown on the drawing and prepare the existing frame opening to receive a new door assembly. Contractor shall verify all field dimensions prior to developing submission for engineer's approval.
3. Doors shall be delivered with factory primed finish.
4. A cove sealant bead shall be installed around the doorframe on both sides.
5. Contractor shall install all required door hardware to match existing set-up including but not limited to thresholds, closers, panic bar, lever handles, weather stripping, kick plates, door stops, etc.
6. Contractor shall install door shoe and kick plate on each door.
7. Doors shall be painted prior to final acceptance.

WI 40.0 CONNECTIONS / BEARINGS

WI 40.1 SHEAR TRANSFER CONNECTIONS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, shoring and jacking, supervision and incidentals necessary to install shear transfer connection at expansion joints as indicated on the Drawings. Refer to Detail 40.1 for specific requirements.

B. Materials

1. Angle shall be galvanized ASTM A36 steel.
2. Anchor bolts and screws shall be stainless steel.
3. Anchoring system shall be Hilti HCA Coil anchors.
4. Slide Bearing Pads: Ultrahigh molecular weight, high-density polyethylene resin. Acceptable material is "Korolath PE" by Koro Corporation, Hudson, Massachusetts.

C. Execution

1. Contractor shall locate, layout Work areas and verify location with Engineer/Architect.
2. Materials are listed in Article "Materials," above.
3. Contractor shall provide and install shear transfer connections as indicated on the Drawings and Detail 40.1.

WI 40.2 SHEAR CONNECTOR REPLACEMENT – PRETOPPED CONCRETE

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, shoring and jacking, supervision and incidentals necessary to install new shear connectors as indicated on the Drawings. Refer to Detail 40.2 for specific requirements.

B. Materials

1. Steel plates and bolts shall be galvanized ASTM A36 steel.
2. Concrete repair materials shall be as specified in Section "Cast-in-Place Repair Mortar".
3. Slide Bearing Pads: Ultrahigh molecular weight, high-density polyethylene resin. Acceptable material is "Korolath PE" by Koro Corporation, Hudson, Massachusetts.
4. If not galvanized, corrosion Inhibiting coating for shear connector:
 - a. "Sikadur 32 Hi-Mod," by Sika Corporation, Lyndhurst, NJ.
 - b. "MasterEmaco ADH 326," by BASF Building Systems, Shakopee, MN.
 - c. "Armotec 110," Sika Corporation, Lyndhurst NJ.
 - d. "Euco 452," The Euclid Chemical Company, Cleveland, OH.

C. Execution

1. Contractor shall locate broken tee flange shear connections as indicated on Drawings and by further visual inspection.
2. Contractor shall verify locations with Engineer/Architect prior to beginning Work.
3. Engineer/Architect may designate additional repair locations.
4. Contractor shall remove and properly dispose of concrete as required to expose existing broken shear connection.
5. Contractor shall remove and properly dispose of related steel from the Work area.
6. Protect remaining exposed steel with corrosion inhibiting coating.
7. Contractor shall provide and install repair concrete at shear connector repair areas in accordance with referenced specification sections listed in Article "Materials," above, as indicated on the Drawings and Detail 40.2.

WI 40.3 RE-WELD SHEAR CONNECTOR

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, shoring and jacking, supervision and incidentals necessary to re-weld existing tee-to-tee shear connector as indicated on the Drawings. Refer to Detail 40.3 for specific requirements.

B. Materials

1. Welds shall be made using E70 electrodes.

2. If not galvanized, corrosion inhibiting coating for shear connector:
 - a. "Sikadur 32 Hi-Mod," by Sika Corporation, Lyndhurst, NJ.
 - b. "MasterEmaco ADH 326," by BASF Building Systems, Shakopee, MN.
 - c. "Armotec 110," Sika Corporation, Lyndhurst NJ.
 - d. "Euco 452," The Euclid Chemical Company, Cleveland, OH.

C. Execution

1. Contractor shall locate and mark broken tee-to-tee connectors exposed by concrete excavation or by visual inspection from underside of slab.
2. Contractor shall verify locations with Engineer/Architect prior to starting Work.
3. Contractor shall sandblast shear connector to bare metal prior to welding.
4. Following welding, Contractor shall apply corrosion inhibitor coating on exposed connector steel in accordance with Section "Cast-in-Place Concrete."

WI 41.0 STEEL STAIRS

WI 41.1 REPLACE STAIR RISER/PAN/FILL

B. Scope of Work

1. Work consists of furnishing all labor, materials, equipment and supervision required to remove and replace the existing deteriorated concrete filled steel stair treads and risers at locations designated by the Engineer. The existing steel stringers, guardrails, and miscellaneous structural steel components are to remain. Work includes disposal of the existing stair treads and risers and painting of newly installed stair risers/pans and any adjacent construction affected by removal/installation of new stair risers/pans. Refer to Detail 41.1 for specific requirements.

C. Materials

1. Steel pans and nosings shall be as specified in Section "Metal Pan Stairs."
2. Concrete fill materials shall be as specified in Section "Cast-in-Place Concrete Restoration".
3. Conventional steel reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or "Work Item 1.4 Concrete Reinforcement."
4. Paint materials shall be as specified in Section "Exterior Painting."

D. Execution

1. Stair treads and risers shall be demolished and removed in accordance with Section "Cutting and Patching,".
2. During demolition of stair treads and risers, contractor is to demolish stair treads and risers in such a way as to cause minimal damage to the existing steel stringers.
3. Portions of the existing stair landings shall be demolished if required to demolish the existing or install the new concrete filled stair risers and pans. Such

- demolition shall be in accordance with Section "Cutting and Patching" and shall be incidental to the stair pan installation.
4. Contractor shall prepare the surface of the existing steel stringer as required for the connection to the new steel treads and risers.
 5. Installation of the stair treads and risers shall be as detailed
 6. Placement of concrete treads shall be as specified in Section "Cast-in-Place Concrete Restoration" or Section "Cast in Place Repair Mortar." Prior to placing concrete, the steel stair assembly shall be painted per detail.
 7. Any portion of the stair landings damaged during the demolition of the existing stair treads and risers or installation of the new stair treads and risers shall be replaced/repared by Contractor at no cost to Owner.

WI 41.2 REPLACE STAIR NOSINGS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment and supervision required to remove deteriorated abrasive stair nosings, repair the concrete fill as required and supply and install new nosings in kind. Refer to Detail 41.2 for specific requirements.

B. Materials

1. Nosings shall be as specified in Section "Metal Pan Stairs" and/or Section "Metal Fabrications."
2. Concrete fill materials shall be as specified in Section "Cast-in-Place Concrete Restoration".

C. Execution

1. Contractor shall remove and dispose of nosings scheduled to be replaced.
2. Any existing adhesice on the concrete fill shall be removed by grinding. Any repair or leveling of the concrete will be carried out as required.
3. New nosings shall be installed in accordance with Section "Metal Fabrications."

WI 41.4 REPLACE STAIR LANDING/FILL

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision, and incidentals required to remove and replace the existing deteriorated concrete filled steel stair landings at locations designated by the Engineer. The existing steel stringers, guardrails, and miscellaneous structural steel components are to remain. Work includes disposal of the existing landings and concrete fill and painting of newly installed stair landings and any adjacent construction affected by removal/installation of new stair landings. Refer to Detail 41.4 for specific requirements.

B. Materials

1. Concrete fill materials shall be as specified in Section "Cast-in-Place Concrete Restoration" or Section "Cast in Place Repair Mortar."
2. Conventional steel reinforcement shall be as specified in Section "Cast-in-Place Concrete Restoration" and/or Work Item 1.4 "Concrete Reinforcement."
3. Metal decking shall be 2" Type C Metal Deck as specified in Section "Metal Pan Stairs."
4. Paint materials shall be as specified in Section "Exerior Painting."

C. Execution

1. Stair landing concrete and metal form deck shall be demolished and removed in accordance with Section "Cutting and Patching,".
2. During demolition of stair landings, contractor is to demolish stair landings in such a way as to cause minimal damage to the existing steel members.
3. Portions of the adjacent stair risers/pans shall be demolished if required curing the demolition of the existing or install of the new stair landing. Such demolition shall be in accordance with Section "Cutting and Patching" and shall be incidental to the stair pan installation.
4. Contractor shall prepare the surface of the existing steel stringer as required for the connection to the new metal form deck.
5. Installation of the new stair landings shall be as detailed.
6. Placement of concrete landings shall be as specified in Section "Cast-in-Place Concrete Restoration" or Section "Cast in Place Repair Mortar." Prior to placing concrete, the metal deck assembly shall be painted per the detail.
7. Any portion of the stair landings damaged during the demolition of the existing stair treads and risers or installation of the new stair treads and risers shall be replaced/repared by Contractor at no cost to Owner.

WI 45.0 PAINTING

WI 45.1 PAINT TRAFFIC MARKINGS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to locate, layout and paint parking stall stripes, traffic arrows, crosswalks, accessible stall access aisles, curbs, symbols, stop bars and all other existing pavement markings.
2. Stripes shall match all existing marks and be provided at same locations.
3. At the Leo A. Roy Parking Garage remove existing stripes in those locations where they conflict with new striping layout.
4. At the Lower Locks Parking Garage remove all existing striping.

B. Materials

1. Painting materials shall be as specified in Section "Pavement Marking."

C. Execution

1. Contractor shall prepare drawing of existing parking layout in repair areas prior to starting with repairs. Contractor shall note stall width, angle of parking, directional traffic arrows and all other existing pavement markings.
2. Contractor shall submit striping plan for Engineer/Architect's approval.
3. Contractor shall locate and layout Work areas as indicated on Drawings and shall match existing pavement markings, except as directed otherwise by Engineer/Architect.
4. Where existing pavement markings conflict with new striping layout, remove conflicting pavement markings as indicated in Division 9 Section "Pavement Marking."
5. Engineer/Architect shall inspect all layout and surface preparation for conditions in accordance with Section "Pavement Marking."
6. Paint materials and associated referenced specifications are listed in Article "Materials," above. Procedures shall be in accordance with referenced specifications.

WI 45.3 CLEAN AND PAINT DOOR & FRAME

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare, prime (as required) and paint exposed metal window/door frames as located on Drawings, including containing and disposing of cleaning, preparation and painting debris/overspray.

B. Materials

1. Materials shall be as specified in Section "Exterior Painting".

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all Work areas.
2. Contractor shall verify color selection with Owner prior to start of Work.
3. Contractor shall take all necessary measures to contain with barriers, preparation/cleaning debris and paint to immediate Work area to protect adjacent property from damage.
4. Mask and protect adjacent elements such as window glass, doors, etc.
5. Contractor shall solvent clean any surface area with oil or grease build-up prior to receiving further preparation in accordance with SSPC-SP1 and Section "Exterior Painting."
6. Contractor shall sandblast all surfaces with surface corrosion to near-white metal blast cleaning in accordance with SSPC-SP10 and Section "Exterior Painting."
7. Contractor shall power tool clean all surfaces with surface corrosion in accordance with SSPC-SP3 and Section "Exterior Painting".

8. Contractor shall air blast and remove all debris from Work area prior to application of primer or paint.
9. Contractor shall apply primer to all cleaned and prepared metal surfaces on same day (within 8 hrs) as cleaning/preparation operations. Apply primer according to Section "Exterior Painting" and in strict accordance with manufacturer's recommendations.
10. Contractor shall apply paint in accordance with referenced specification section listed in "Materials" above.

WI 45.6 CLEAN AND PAINT STAIR RISERS, RAILINGS AND FRAMING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare, prime and paint all steel risers, railings and stair framing as located on Drawings.

B. Materials

1. Materials shall be as specified in Section "Exterior Painting".

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all Work areas.
2. Contractor shall verify color selection with Owner prior to start of Work.
3. Contractor shall take all necessary measures to contain, with full height barriers, sandblasting debris and paint to immediate Work area to protect public from injury and vehicles and public property from damage.
4. Contractor shall solvent clean any surface area with oil or grease build-up prior to receiving sandblast preparation in accordance with SSPC-SP1 and Section "Painting."
5. Contractor shall sandblast all surfaces with surface corrosion to near-white metal blast cleaning in accordance with SSPC-SP10 and Section "Exterior Painting."
6. Contractor shall air blast and remove all debris from Work area prior to application of primer or paint.
7. Contractor shall apply primer to all sandblasted metal surfaces on same day (within 8 hrs) as sandblast operations. Apply primer according to Section "Exterior Painting" and in strict accordance with manufacturer's recommendations.
8. Contractor shall apply paint in accordance with referenced specification section listed in Work Item "Paint Structural Steel," Article "Materials," above.

WI 45.7 CLEAN AND PAINT SHELF ANGLE

B. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare by SSPC-SP- 3 "Power Tool Cleaning" and paint structural steel shelf angles exposed during repair work. This Work Item is

applicable where masonry/stone removals do not allow complete removal of the existing shelf angles, and shelf angles must be cleaned and painted in place.

B. Materials

1. Materials shall be as specified in Section "Exterior Painting".

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all shelf angles for cleaning and painting.
2. Inspect existing shelf angle for corrosion. If existing conditions show greater than 20% section loss, notify Engineer for direction.
3. Contractor shall clean all exposed surfaces with surface corrosion in accordance with SSPC-SP-3 "Power Tool Cleaning".
4. Contractor shall air blast and remove all debris from Work area prior to application of primer and/or paint.
5. Contractor shall apply primer/paint to all sandblasted metal surfaces on same day (within 8 hrs) as sandblast operations. Apply primer/paint according to Section "Exterior Painting."

WI 45.8 CLEAN AND PAINT PIPE GUARDS

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to remove existing pipe guards, prepare by SSPC-SP- 3 "Power Tool Cleaning," paint pipe guards and reinstall the same.

B. Materials

1. Materials shall be as specified in Section "Exterior Painting".

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all pipe guards scheduled for cleaning and painting.
2. Inspect existing steel for corrosion. If existing conditions show greater than 20% section loss, notify Engineer for direction.
3. Contractor shall clean all exposed surfaces with surface corrosion in accordance with SSPC-SP-3 "Power Tool Cleaning".
4. Contractor shall air blast and remove all debris from Work area prior to application of primer and/or paint.
5. Contractor shall apply primer/paint to all sandblasted metal surfaces on same day (within 8 hrs) as cleaning operations. Apply primer/paint according to Section "Exterior Painting."
6. Reinstall pipe guards with new stainless steel expansion anchors.

WI 45.9 PAINT LEVEL 4 PEDESTRIAN BRIDGE STRUCTURAL STEEL FRAMING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to prepare, prime and paint all structural steel framing members supporting the pedestrian bridge

B. Materials

1. Painting materials shall be as specified in Section "Exterior Painting."

C. Execution

1. Contractor shall locate and verify with Engineer/Architect all Work areas.
2. Contractor shall verify color selection with Owner prior to start of Work.
3. Contractor shall take all necessary measures to contain, with full height barriers, debris and paint to immediate Work area to protect public from injury and vehicles and public property from damage.
4. Contractor shall solvent clean any surface area with oil or grease build-up in accordance with SSPC-SP1 prior to preparing exposed surfaced of structural steel members in accordance with SSPC-SP 3 and Section "Exterior Painting."
5. Contractor shall dry surface prior to application of paint.
6. Contractor shall apply primer to all exposed prepared metal surfaces on same day (within 8 hrs) as preapration. Apply primer in strict accordance with manufacturer's recommendations.
7. Contractor shall apply paint in accordance with referenced specification section listed in Work Item "Paint Structural Steel Framing," Article "Materials," above.

WI 90.0 FAÇADE CLEANING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to clean façade surfaces using approved cleaning products and techniques.
2. Preliminary work includes sample mock-up cleanings using various combinations of cleaning products and techniques to establish required end results to be applied to the balance of areas to be cleaned.
3. Work includes pre-treatment, containment, post-treatment and disposal of run-off/by-products from cleaning operations as required to meet local requirements of jurisdiction where project is located. Coordinate and verify requirements with local agencies as required prior to start of cleaning work.

B. Materials

1. Cleaning products used shall not damage substrates. Use only products shown to effectively clean substrates without damage. Submit to Engineer for review.

2. Cleaning/rinse water shall be potable water with mineral content that will not stain cleaned building surfaces. Treat/filter water prior to use if required to eliminate staining potential.
3. Equipment used for application of cleaning products/media shall be adjusted and calibrated as required on an ongoing basis to keep from damaging existing substrates.
4. Specific products and techniques shall be as stated in the applicable work items.

C. Execution

1. Perform sample cleaning mock-ups as described in "Scope of Work" at existing building location(s) determined by Owner and Engineer.
2. Mask all surfaces that may be adversely affected by run-off from cleaning operations. Do not allow cleaning materials/run-off to enter building air intakes, coordinate work at and near these areas with building operations staff.
3. Perform cleaning at times acceptable to Owner with regard to impact of cleaning materials and operations on building operations and impact on the general public, pedestrians and property surrounding the project site.
4. If required by local codes/regulations, collect and treat run-off water to levels acceptable for release to local sewers.
5. Rinse all surfaces after cleaning as required to remove all residual cleaning materials. More than one rinse may be required depending on cleaning materials and building conditions.

WI 90.1LL CLEAN FAÇADE – DETERGENT AND PRESSURE WASHING

A. Scope of Work

1. Work consists of furnishing all labor, materials, equipment, supervision and incidentals necessary to clean façade surfaces using detergent, brush/scrapper scrubbing and pressurized water.
2. See Work Item "Façade Cleaning" for additional general requirements for cleaning operations.

B. Materials

1. See Work Item "Façade Cleaning" for general material requirements for cleaning operations.
2. Detergents shall be mild, general purpose detergent/cleaning agent that is biodegradable and does not create excessive foaming.
3. Pressure washing equipment shall be adjusted to acceptable pressure that does not damage existing facade. Adjust pressure as required on an ongoing basis to keep from damaging existing substrates.

C. Execution

1. See Work Item "Façade Cleaning" for execution requirements for cleaning operations.

END OF SECTION 020010

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SECTION 025130 - GENERAL CONCRETE SURFACE PREPARATION

PART 1 - GENERAL

1.1 DEFINITIONS

- A. **DELAMINATIONS:** Fracture planes, "internal cracks," within concrete. Typically these fractures are parallel to the member face and vary in depth.
- B. **NEAR-VERTICAL CHIPPED EDGES:** Provide an edge dressed to within 20° of perpendicular of finished surface.
- C. **SPALLS:** Potholes, cavities or voids in floor slabs, beams, columns, and walls. Usually result of delamination migrating to face of concrete member. When fracture finally reaches surface, concrete encompassed by delamination breaks away, resulting in spall.
- D. **UNSOUND CONCRETE:** Concrete exhibiting one or more of:
 - 1. Incipient fractures present beneath existing delaminated or spalled surfaces.
 - 2. Honeycombing.
 - 3. Friable or punky areas.
 - 4. Deterioration from freeze-thaw action.
- E. **SCALING:** Deterioration which attacks mortar fraction (paste) of concrete mix. First appears as minor flaking and disintegration of concrete surface. Scaling eventually progresses deeper into concrete, exposing aggregate which breaks away. Concrete scaling is caused by freeze-thaw action. If concrete is frozen in saturated state, excess water freezing in concrete causes high internal stresses.
- F. **SHOTBLASTING:** Scarification of concrete surfaces using an abraded metal shot-rebound. See Corps of Engineer's Manual EM 1110-2-2002 and the National Cooperative Highway Research Program's Report #99 for a more detailed definition.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 025130

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SECTION 025140 - SURFACE PREPARATION FOR PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, equipment, supervision and incidentals necessary to locate and remove all delaminated and unsound concrete and preparation of cavities created by removal to receive patching material and preparation of existing surface spalls and potholes to receive patching material.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 03 Section "Cast-in-Place Repair Mortar"
 - 2. Division 03 Section "Trowel Applied Mortar"

1.3 REFERENCES

- A. "Specifications for Structural Concrete for Buildings" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 - 1. "Guide for Repair of Concrete Bridge Superstructures" (ACI 546.1), American Concrete Institute.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Corrosion Inhibitor/Bonding agent:
 - 1. Acceptable products are:
 - a. "Emaco P24," BASF Construction Chemicals, Shakopee, MN.
 - b. "Armotec 110," Sika Corporation, Lyndhurst, NJ.

PART 3 - EXECUTION

3.1 INSPECTION

A. Floor Slabs:

1. Locate floor slab delaminations by sounding surface with hammer, rod, or chain drag. When delaminated area is struck, distinct hollow sound is heard.
2. Contractor shall sound all designated floors for delaminations.
3. Certain structural systems that contain thin slab thicknesses with Welded Wire Reinforcement or other small diameter reinforcing, such as waffle slab or precast tees, may have significant deterioration without evidence of delaminations. These structural systems require qualified personnel to provide additional inspections, primarily visual in nature, to define the extent of deterioration.
4. Contractor shall visually inspect thin slab thicknesses with small diameter reinforcing for deterioration.

B. Vertical and Overhead Surfaces:

1. Locate vertical and overhead surface delaminations by sounding appropriate member with hammer or rod.
2. Cracks, usually horizontal in orientation along beam faces, and vertical in orientation near column corners are indicators of delaminated concrete.
3. Contractor shall sound only vertical and overhead surfaces that show evidence of cracking and/or salt and water staining.

C. Delaminated areas, once located by Contractor, shall be further sounded to define limits. Mark limits with chalk or paint.

D. Contractor shall locate spalls by visual inspection and mark boundaries with chalk or paint after sounding surface. Engineer/Architect will define and mark additional unsound concrete areas for removal, if required.

E. Areas to be removed shall be as straight and rectangular as practical to encompass repair and provide neat patch.

F. Contractor shall locate and determine depth of all embedded REINFORCEMENT, POST-TENSIONING TENDONS, and ELECTRICAL CONDUIT in repair area and mark these locations for reference during concrete removal. Do **NOT** nick or cut any embeds unless approved by Engineer/Architect.

3.2 PREPARATION

A. **Temporary shoring may be required at concrete floor repair areas exceeding 5 sq ft and at any beam, joist, or column repair. Contractor: Review all marked removal and preparation areas and request clarification by Engineer/Architect of shoring requirements in questionable areas. Shores shall be in place prior to concrete removal and cavity preparation in any area requiring shores.**

B. Mark boundaries of delaminated, spalled and unsound concrete floor areas. All concrete shall be removed from within marked boundary to minimum depth of 0.75 in.

using 15 to 30 lb chipping hammers equipped with chisel point bits. When directed by Engineer/Architect, chipping hammers less than 15 lb shall be used to minimize damage to sound concrete. If delaminations exist beyond minimum removal depth, chipping shall continue until all unsound and delaminated concrete has been removed from cavity.

- C. Where embedded reinforcement or electrical conduit is exposed by concrete removal, exercise extra caution to avoid damaging it during removal of unsound concrete. If bond between exposed embedded reinforcement and adjacent concrete is impaired by Contractor's removal operations, Contractor shall perform additional removal around and beyond perimeter of reinforcement for minimum of 0.75 in. along entire length affected at no cost to Owner.
- D. If rust is present on embedded reinforcement where it enters sound concrete, additional removal of concrete along and beneath reinforcement required. Additional removal shall continue until non-rusted reinforcement is exposed, or may be terminated as Engineer/Architect directs.
- E. Sawcut to depth of 0.75 in. into floor slab, unless otherwise noted. For vertical and overhead surfaces marked boundary may be sawcut, ground or chipped to depth of 0.5 in. to 0.625 in. into existing concrete, measured from original surface. All edges shall be straight and patch areas square or rectangular-shaped. Diamond blade saw or grinder with abrasive disk suitable for cutting concrete is acceptable for performing work. Edge cut at delamination boundary shall be dressed perpendicular to member face. It shall also be of uniform depth, for entire length of cut. Exercise extra caution during sawcutting to avoid damaging existing reinforcement (ESPECIALLY POST-TENSIONING TENDONS AND SHEATHING) and electrical conduit and any other embedded items near surface of concrete. Any damage to existing reinforcement, post-tensioning tendons or sheathing during removals shall be repaired by Contractor with Engineer/Architect-approved methods at no additional cost to Owner.

3.3 INSPECTION OF REPAIR PREPARATION

- A. After removals are complete, but prior to final cleaning, cavity and exposed reinforcement shall be inspected by Contractor and verified by Engineer/Architect for compliance with requirements of this Section. Where Engineer/Architect finds unsatisfactory cavity preparation, Engineer/Architect shall direct Contractor to perform additional removals. Engineer/Architect shall verify areas after additional removals.
- B. Contractor shall inspect embedded reinforcement and conduits exposed within cavity for defects due to corrosion or damage resulting from removal operations. Contractor shall notify Engineer/Architect of all defective and damaged reinforcement or conduits. Replacement of damaged or defective reinforcement or conduits shall be performed according to this Section and as directed by Engineer/Architect.

3.4 REINFORCEMENT AND EMBEDDED MATERIALS IN REPAIR AREAS

- A. All embedded reinforcement exposed during surface preparation that has lost more than 15% (10% if 2 or more consecutive parallel bars and/or tendons are affected) of original cross-section due to corrosion shall be considered DEFECTIVE. All non-defective exposed reinforcement that has lost section to extent specified above as direct result of Contractor's removal operations shall be considered DAMAGED.
- B. **Embedded materials** including, but not limited to, electrical conduit and post-tensioning, **shall be protected by Contractor** during removal operations. **Damage due to removal operations shall be repaired by Contractor in accordance with national code requirements at no cost to Owner.** Embedded materials which are defective due to pre-existing conditions may be repaired or replaced by Contractor or abandoned at Owner's option and cost.
- C. Supplement defective or damaged embedded reinforcement by addition of reinforcement of equal diameter with Class "B" minimum splice per ACI 318 beyond damaged portion of reinforcement. Secure new reinforcement to existing reinforcement with wire ties and/or approved anchors. Supplemental reinforcement shall be ASTM A615 Grade 60 steel installed in accordance with Section "Cast-in-Place Concrete." Tendon supplement or repair materials, when applicable, shall be as required by Section "Work Items."
- D. Loose and supplemental reinforcement exposed during surface preparation shall be securely anchored prior to patch placement. Loose reinforcement shall be adequately secured by wire ties to bonded reinforcement or shall have drilled-in anchors installed to original concrete substrate. Drilled-in anchors shall be Powers "Tie-Wire Lok-Bolt" anchors, ITW Ramset/Red Head "TW-1400" anchor, or approved equivalent. Supplemental reinforcing needed to be held off substrate shall be adequately secured by drilled-in anchors installed to original concrete substrate with Powers "Tie-Wire Spike", ITW Ramset/Red Head Redi-Drive "TD4-112" anchors, or approved equivalent. Engineer/Architect will determine adequacy of wire ties and approve other anchoring devices prior to their use. Securing loose and supplemental reinforcement is incidental to surface preparation and no extras will be allowed for this Work.
- E. Concrete shall be removed to provide minimum of 3/4 in. clearance on all sides of defective or damaged exposed embedded reinforcement that is left in place. Minimum of 1.5-in. concrete cover shall be provided over all new and existing reinforcement. Concrete cover over reinforcement may be reduced to 1 in. with Engineer/Architect's approval if coated with an approved epoxy resin.
- F. Supplemental reinforcement and concrete removals required for repairs of defective or damaged reinforcement shall be paid for as follows:
 - 1. Concrete removals and supplemental reinforcement required for repairs of DEFECTIVE reinforcement shall be paid for by Owner at unit price bid.
 - 2. Concrete removals and supplemental reinforcement required for repairs of DAMAGED reinforcement shall be paid for by Contractor.

3.5 CLEANING OF REINFORCEMENT WITH DELAMINATION AND SPALL CAVITIES

- A. All exposed steel shall be cleaned of rust to bare metal by sandblasting. Cleaning shall be completed immediately before patch placement to insure that base metal is not exposed to elements and further rusting for extended periods of time. Engineer/Architect may require entire bar diameter be cleaned.
- B. After all sandblasting operations and cleanup are completed, paint all exposed steel with an approved epoxy. Protect prepared surfaces from damage prior to and during patch placement.

3.6 PREPARATION OF CAVITY FOR PATCH PLACEMENT

- A. Cavities will be examined prior to commencement of patching operations. Sounding surface shall be part of examination. Any delamination noted during sounding shall be removed as specified in this Section.
- B. Cavities shall be sandblasted. Airblasting is required as final step to remove sand. All debris shall be removed from site prior to commencement of patching.

END OF SECTION 025140

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SECTION 033021 - CAST-IN-PLACE CONCRETE RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mix design, placement procedures, and finishes.
- B. Work in other Sections related to Cast-in-Place Concrete:
 - 1. Division 1 Section "Project Management and Coordination."
 - 2. Division 1 Section "Quality Control."
 - 3. Division 3 Section "Unbonded Post-Tensioned Concrete."
 - 4. Division 7 Section "Traffic Coatings."
 - 5. Division 7 Section "Water Repellants."
 - 6. Division 7 Section "Expansion Joint Assemblies."
 - 7. Division 7 Section "Concrete Joint Sealants."
 - 8. Division 9 Section "Pavement Marking."

1.3 SUBMITTALS

- A. General: In addition to the following, comply with submittal requirements in ACI 301.
- B. Product Data: For each type of manufactured material and product indicated.
- C. Design Mixes: For each concrete mix.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.
- C. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

- D. Comply with ACI 301, "Specification for Structural Concrete," including the following, unless modified by the requirements of the Contract Documents.
 - 1. General requirements, including submittals, quality assurance, acceptance of structure, and protection of in-place concrete.
 - 2. Formwork and form accessories.
 - 3. Steel reinforcement and supports.
 - 4. Concrete mixtures.
 - 5. Handling, placing, and constructing concrete.

1.5 CONTRACTOR'S PROFESSIONAL SERVICES - PERFORMANCE AND DESIGN CRITERIA

- A. Provide professional services for temporary conditions during construction and portions of the Work required to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Specific requirements and criteria include, but are not limited to the following:
 - 1. Design, erect, shore, brace, and maintain formwork, according to ACI 301 and ACI 347 to support vertical, lateral, static and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads. The contractor is responsible for layout and design, reviews, approvals, and inspections.
 - 2. Design formwork, shoring, bracing, and other conditions for structural requirements and stability during construction and until final structure is completed and accepted.
 - a. Comply with ACI 347.2 for design, installation, and removal of shoring and reshoring.
 - b. Check early-age strength of concrete members against anticipated construction loads. Reduce the load on concrete members at the critical concrete age or change the concrete mixture for accelerated strength gain to avoid distress of concrete members.
 - c. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads such that no floor or member would be excessively loaded or would induce tensile stresses in concrete members.
 - d. Plan sequence of removal of shores and reshores to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excess stress or deflection.
 - e. Consider the effects of post-tensioning sequence for post-tensioned beams and girders. Review post-tensioning design criteria on the drawings and in specification Section "Unbonded Post-tensioned Concrete."
- B. Design the "Nominal Form Width" for linear gap at time of forming or erecting concrete elements bounding the expansion joints in accordance with Drawings and Specification Section "Expansion Joint Assemblies."

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and form accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

- A. Epoxy-coated Reinforcing Bars: ASTM A775
- B. Epoxy-Coated Welded Wire Fabric: ASTM A884, fabricated from as-drawn steel wire into flat sheets, mats only. Roll stock prohibited.
- C. Provide bar supports according to CRSI's "Manual of Standard Practice." Use all-plast bar supports when in contact with exposed concrete surface.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Types I or II or Type I/II.
- B. Fly Ash: ASTM C618, Class C or Class F.
- C. Ground-Granulated Blast Furnace Slag: ASTM C989, Gr. 100 or higher.
- D. Silica Fume: ASTM C1240.
- E. Normal-Weight Aggregate: ASTM C 33, uniformly graded, not exceeding 3/4 inch nominal size.
 - 1. Combine Aggregate Gradation: Well graded from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 sieve, and less than 8 percent may be retained on sieves finer than No. 50.
- F. Water: Potable and complying with ASTM C 1602.

2.4 ADMIXTURES

- A. General: Admixtures certified by manufacturer to contain no more than 0.1 percent water-soluble chloride ions by mass of cement and to be compatible with other admixtures. Do not use admixtures containing calcium chloride.
- B. General: Admixtures certified by manufacturer that all admixtures used are mutually compatible.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or high-range water reducing admixture in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, fiber reinforced concrete, and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 4. Use non-corrosive accelerator for all concrete, less than 8 inches thick, placed at air temperatures below 50 degrees Fahrenheit.
 5. Use corrosion-inhibiting admixture in parking structure slabs and other areas so noted on the drawings. The dosage shall be 3 gallons per cubic yard.
- D. Normal Water-Reducing Admixture: ASTM C 494, Type A.
- E. Mid Range Water-Reducing Admixture: ASTM C 494, Type A.
- F. High-Range, Water-Reducing Admixture (Superplasticizer): ASTM C 494, Type F.
- G. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
- H. Air Entraining Admixture: ASTM C260.
- I. Non-Chloride, Non-Corrosive Water-Reducing, Accelerating Admixture: ASTM C 494, Type C or E.
1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon AcN-Series," "Accelguard 80," "Accelguard NCA," or "Accelguard 90," by Euclid Chemical Company.
 - b. "DCI," "PolaraSet," "Lubricon NCA," "Daraset" or "Gilco," by W.R. Grace & Co.
 - c. "Pozzutec 20+" or "Pozzolith NC 534," by BASF Construction Chemicals.
 - d. "Sika Set NC," "Plastocrete 161FL," or "Sika Rapid-1," by Sika Corporation.
 - e. "Catexol 2000 RHE," by Axim Concrete Technologies.
 - f. "Polychem NCA" or "Polychem Super Set," General Resource Technology.
 - g. "LCNC-166," Russ Tech Admixtures, Inc.
- J. Water-Reducing or Retarding Admixture: ASTM C 494, Type D or B.
1. Products: Subject to compliance with requirements, provide one of following:
 - a. "Eucon Retarder-75", "Eucon DS" or "Eucon W.O." Euclid Chemical Co.
 - b. "Daratard-17" or "Recover," W.R. Grace & Co.
 - c. "Pozzolith Series" or "Delvo Series," BASF Construction Chemicals.
 - d. "Sikatard Series," or "Plastiment Series" or "Plastocrete Series," Sika Corporation.
 - e. "Polychem R," General Resource Technology.
 - f. "LC-400 Series" or "LC-500 Series," Russ Tech Admixtures, Inc.

- K. Corrosion Inhibiting Admixture shall be capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. "Eucon CIA" or "Eucon BCN," Euclid Chemical Company.
 - b. "DCI" or "DCI-S," W.R. Grace.
 - c. "Rheocrete CNI," BASF Construction Chemicals.
 - d. "Sika CNI," Sika Corporation.
 - e. "Catexol 1000 CN-Cl," Axim Concrete Technologies.
 - f. "Polychem CI," General Resource Technology.
 - g. "Russ Tech RCI," Russ Tech Admixtures, Inc.
 2. Add at rate of 3 gal/cu yd of concrete, which shall inhibit corrosion to 9.9 lb of chloride ions per cu. yd. of concrete. Calcium Nitrite based corrosion inhibitor shall have a concentration of 30 percent, plus or minus 2 percent of solids content.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry. Materials must be free of harmful substances, such as sugar or fertilizer, or substances that may discolor the concrete. To remove soluble substances, burlap should be thoroughly rinsed in water before placing it on the concrete.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.

2.6 CONCRETE MIXES

- A. Comply with ACI 301 requirements for concrete mixtures.
- B. Prepare design mixes, proportioned according to ACI 301, for normal-weight concrete determined by either laboratory trial mix or field test data bases, as follows:
 1. Compressive Strength (28 Days): 5000 psi.
 2. Maximum w/cm ratio: See Drawing Notes.
 3. Air Content: See Drawing Notes.
 4. Maximum Permissible Cementitious Material Content:
 - a. Fly Ash: 25 per cent
 - b. Slag: 50 per cent
 - c. Silica Fume: 10 per cent

- d. Fly Ash plus Slag plus Silica Fume: 50 per cent
- e. Fly Ash plus Silica Fume: 35 per cent
- 5. Slump: 4 inches (100 mm).
 - a. Slump Limit for Concrete Containing High-Range Water-Reducing Admixture: Not more than 8 inches (200 mm) after adding admixture to plant- or site-verified, 2- to 3-inch (50- to 75-mm) slump.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with ASTM C 94 and ASTM C 1116.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
 - 1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least one and one-half minutes, but not more than five minutes after ingredients are in mixer, before any part of batch is released.
 - 2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

2.8 MATERIAL ACCESSORIES

- A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar. Product shall be capable of achieving bond strength of 2,700 psi per ASTM C 882.
 - 1. Acceptable materials for this Work are:
 - a. "Duralprep A.C." by The Euclid Chemical Company, Cleveland, OH.
 - b. "Sika Armatec 110 EpoCem", by Sika Corporation, Lyndhurst, NJ.
 - c. Other types may be used only with Engineer/Architect's approval in writing prior to bidding.
- B. Joint Fillers
 - 1. Joint filler in slabs and curbs per ASTM D1751 Asphalt impregnated fiber board; as shown on Drawings. Acceptable products as follows:

- a. "Flexcell," Knight-Celotex Corp.
 - b. "Fibre Expansion Joint," W.R. Meadows, Inc.
2. Joint filler used vertically to isolate walls from columns or other walls: White molded polystyrene beadboard type.
3. Joint cover used to bridge gap between columns and grade walls, retaining walls, or basement walls: Minimum width: Gap width plus 4 in. For gaps over 3 in. wide, protect cover with protection board sized to span gap satisfactorily. Acceptable products:
 - a. "Sealtight Premoulded Membrane Vapor Seal," W.R. Meadows, Inc., Elgin, Illinois.
 - b. "Sealtight Melgard," W.R. Meadows, Inc., Elgin, Illinois and shall be applied according to manufacturer's instructions.

2.9 TOOLS

A. Slab Jointing

1. Concrete groovers: For tooled joints in concrete:
 - a. For concrete not exceeding 4 in. thickness, use groover with 1 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
 - b. For concrete exceeding 4 in. thickness, use groover with 1.5 in. deep v-cut bit, 0.5 in. surface width and 3/16 in. to 1/4 in. edge radius.
2. Saw Cut Joints:
 - a. Acceptable tool: "Soff-Cut Saw Model 310" or "Model G2000," Soff-Cut International, Corona, CA.
 - 1) Cut joint as soon as concrete will support weight of operator and saw without deforming.
 - 2) Joint shall be 1 in. deep for concrete thickness of 4 in. or less. Joint shall be 1.5 in. deep for concrete exceeding 4 in. thickness. Do not cut reinforcement.
 - 3) Extend joint to adjacent vertical surface within 30 minutes of cutting.
 - 4) Retool or grind sawcut joint before installing sealant to provide equivalent dimensions, shape and volume as joint obtained by tooled joint. Surface width shall be 0.5 in. with 3/16 to 1/4 in. edge radius.

- B. All joints subject to acceptance by sealant installer. Concrete contractor to rework rejected joints until acceptable to sealant installer.

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MEETING

- A. Conduct a preconstruction meeting addressing the concrete preparation, installation, protection, quality control, and acceptance of Work.

3.2 FORMWORK

- A. Design, construct, erect, shore, brace, and maintain formwork according to ACI 301.

3.3 STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install so as not to impair strength or appearance of concrete, at locations indicated or as approved by Engineer.
- C. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint filler full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

3.5 CONCRETE PLACEMENT

- A. Comply with recommendations in ACI 304R for measuring, mixing, transporting, and placing concrete.
- B. Do not add water to concrete during delivery, at Project site, or during placement.
- C. Consolidate concrete with mechanical vibrating equipment.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch (6 mm) in height rubbed down or chipped off.
 - 1. Apply to concrete surfaces not exposed to public view.

- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.7 FINISHING NON-FORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.
 - 1. Do not further disturb surfaces before starting finishing operations.
- C. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.8 TOLERANCES

- A. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

3.9 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during placement. Keep concrete continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.1 lb/sq. ft. x h before and during finishing operations. Apply material according to manufacturer's written instructions one or more times after placement, screeding and bull floating concrete, but prior to float finishing. Repeated applications are prohibited after float finishing has begun.
 - 1. Acceptable evaporation retarder materials for this Work are:
 - a. "Cimfilm", by Axim Concrete Technologies.
 - b. "MasterKure ER 50," by BASF Construction Chemicals, Shakopee, MN.
 - c. "Aquafilm", by Conspec Marketing & Manufacturing Co., Inc.
 - d. "Sure-Film (J-74)", by Dayton Superior Corporation.

- e. "Eucobar", or "Tamms Surface Retarder", by The Euclid Chemical Company, Cleveland, OH.
 - f. "E-Con", by L&M Construction Chemicals, Inc.
 - g. "EVRT", by Russ Tech Admixtures, Inc.
 - h. "SikaFilm", by Sika Corporation, Lyndhurst, NJ.
- C. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308 for duration of at least seven days by moisture curing or moisture retaining covering. Provide additional curing immediately following initial curing and before concrete has dried.
- 1. Continue method used in initial curing.
 - 2. Material conforming to ASTM C171.
 - 3. Other moisture retaining covering as approved by Engineer/Architect.
 - 4. During initial and final curing periods maintain concrete above 50°.
 - 5. Prevent rapid drying at end of curing period.
- D. Concrete surfaces to receive slab coatings or penetrating sealers shall be cured with moisture curing or moisture-retaining cover.
- E. Curing Methods: Cure formed and non-formed concrete moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
- 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner shall engage a qualified independent testing and inspecting agency acceptable to the Engineer to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ACI 301.
- 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

2. Determine strength at 3, 7, and 28 days. Each test shall consist of two 6-inch diameter cylinders or three 4-inch diameter cylinders. Testing shall be in accordance with ASTM C39.

3.11 EVALUATION AND ACCEPTANCE OF WORK

A. Acceptance of Repairs (ACI 301):

1. Acceptance of completed concrete Work will be according to provisions of ACI 301.
2. Repair areas shall be sounded by Engineer and Contractor with hammer or rod after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
3. If shrinkage cracks appear in repair area when initial curing period is completed, repair shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.

END OF SECTION 033021

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SECTION 033760 - TROWEL APPLIED MORTAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, supervision and incidentals necessary to prepare deteriorated or damaged concrete surfaces and install patches to overhead and vertical surfaces to restore original surface condition and integrity.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "Work Items."
 - 3. Division 02 Section "General Concrete Surface Preparation."
 - 4. Division 02 Section "Surface Preparation for Patching."
 - 5. Division 03 Section "Cast-In-Place Concrete - Restoration."
 - 6. Division 03 Section "Cast in Place Repair Mortar."
 - 7. Division 03 Section "Epoxy Injection Systems."

1.3 QUALITY ASSURANCE

- A. Work shall conform to requirements of ACI 301 as applicable except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Testing Agency:
 - 1. Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
 - 2. Accredited by AASHTO under ASTM C1077. Testing laboratory shall submit documented proof of ability to perform required tests.
- C. Testing Agency is responsible for conducting, monitoring and reporting results of all tests required under this Section. Testing Agency has authority to reject mortar not meeting Specifications.
- D. Sampling and testing of mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than three years old.

- E. Testing Agency shall submit following information for Field Testing of Concrete unless modified in writing by Engineer/Architect:
1. Project name and location.
 2. Contractor's name.
 3. Testing Agency's name, address and phone number.
 4. Mortar manufacturer.
 5. Date of report.
 6. Testing Agency technician's name (sampling and testing).
 7. Placement location within structure.
 8. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
 9. Date, time, and place of test.
 10. Compressive test data:
 - a. Cube number.
 - b. Age of mortar when tested.
 - c. Date and time of cube test.
 - d. Compressive strength.

1.4 REFERENCES

- A. "Standard Specification for Structural Concrete" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
1. "Building Code Requirements for Structural Concrete" (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 2. "Hot Weather Concreting" reported by ACI Committee 305.
 3. "Cold Weather Concreting" reported by ACI Committee 306.
 4. "Standard Specification for Curing Concrete" (ACI 308)
- C. Contractor shall have following ACI publications at Project construction site at all times:
1. "Standard Specifications for Structural Concrete (ACI 301) with Selected ACI and ASTM References," ACI Field Reference Manual, SP15.
 2. "Hot Weather Concreting" reported by ACI Committee 305.
 3. "Cold Weather Concreting" reported by ACI Committee 306.
 4. "Standard Specification for Curing Concrete" (ACI 308)
- D. American Society for Testing and Materials (ASTM):

1. ASTM C109, "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
2. ASTM C31, "Test Method for Compressive Strength of Cylindrical Concrete Specimens."

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Contractor: At pre-construction meeting, submit procedures for demolition, surface preparation, material batching, placement, finishing, and curing of application. Provide procedure to protect fresh patches from severe weather conditions.
- C. Testing Agency: Promptly report all mortar test results to Engineer/Architect and Contractor. Include following information:
 1. See Article "Quality Assurance," paragraph "Testing Agency shall submit...."
 2. Strength determined in accordance with ASTM C109.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Trowel Applied Repair Mortar: Shall be prepackaged, polymer-modified and silica-fume-modified cementitious repair mortar capable of vertical/overhead application by trowel achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C 109 as certified by manufacturer. Manufacturer to submit volume and size of SSD aggregate used for mix extension.
 1. Acceptable materials for this Work are as follows:
 - a. Polymer-modified:
 - 1) "MasterEmaco N 400 RS," "MasterEmaco N 426," or "MasterEmaco N 300 CI" by BASF Construction Chemicals, Shakopee, MN.
 - 2) "Verticoat," "Speedcrete PM," or "Duraltop Gel" by The Euclid Chemical Company, Cleveland, OH.

- 3) "SikaRepair 223 with Latex R", "SikaRepair SHB with Latex R", or "SikaRepair SHA with Latex R," by Sika Corporation, Lyndhurst, NJ.
- 4) "Planitop 23" OR "PLANITOP X5 with "PLANICRETE AC", by MAPEI Corporation, Deerfield Beach, FL
- 5) "Super-Top OV" by King Packaged Materials Company, Burlington, ON
- 6) Other types may be used only with Engineer/Architect's approval prior to bidding.

b. Polymer and silica fume modified:

- 1) "Gel Patch," or "Verticoat Supreme" by The Euclid Chemical Company, Cleveland, OH.
- 2) "Sikacrete 211 SCC Plus" by Sika Corporation, Lyndhurst, NJ.
- 3) "Planitop II SCC", by MAPEI Corporation, Deerfield Beach, FL.
- 4) Other types may be used only with Engineer/Architect's approval in writing prior to bidding.

2.2 MATERIAL ACCESSORIES

- A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar. Product shall be capable of achieving bond strength of 2,700 psi per ASTM C 882.

1. Acceptable materials for this Work are:

- a. "Duralprep A.C." by The Euclid Chemical Company, Cleveland, OH.
- b. "Sika Armatec 110 EpoCem", by Sika Corporation, Lyndhurst, NJ.
- c. "PLANIBOND 3C", by MAPEI Corporation, Deerfield Beach, FL.
- d. Other types may be used only with Engineer/Architect's approval in writing prior to bidding.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Cavity surfaces shall be clean and dry prior to commencement of patch installation. Preparation of cavity to receive new mortar shall be in accordance with Section "Surface Preparation for Patching" and manufacturer's instructions.

3.2 INSTALLATION

- A. Repair Mortar Bonding Grout:

1. Mix and apply bonding grout in strict accordance with manufacturer's recommendations.
 2. If bonding grout dries, cavity shall not be patched until it has been recleaned and prepared as specified in Section "Surface Preparation for Patching." Grout shall not be applied to more cavities than can be patched within 0.25 hr by available manpower.
- B. Mortar Placement: Patching materials shall be placed immediately following grout application in strict accordance with manufacturer's instructions. Properly proportioned and mixed patch material shall be placed using trowels to consolidate patch so that no voids exist within new material and continuous contact with base concrete is achieved. Supplemental wire mesh shall be required for delamination and spall repairs greater than two inches in depth. Fresh bonding grout is required between successive lifts of patching material.

3.3 CURING

- A. Protect freshly placed concrete repair mortar from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during placement. Keep patch material continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
1. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.1 lb/sq. ft. x h before and during finishing operations. Apply material according to manufacturer's written instructions one or more times after placement, but prior to float finishing. Repeated applications are prohibited after float finishing has begun.
 2. Acceptable evaporation retarder materials for this Work are:
 - a. "Cimfilm", by Axim Concrete Technologies.
 - b. "MasterKure ER 50", by BASF Construction Chemicals, Shakopee, MN.
 - c. "Aquafilm", by Conspec Marketing & Manufacturing Co., Inc.
 - d. "Sure-Film (J-74)", by Dayton Superior Corporation.
 - e. "Eucobar", or "Tamms Surface Retarder", by The Euclid Chemical Company, Cleveland, OH.
 - f. "E-Con", by L&M Construction Chemicals, Inc.
 - g. "EVRT", by Russ Tech Admixtures, Inc.
 - h. "SikaFilm", by Sika Corporation, Lyndhurst, NJ.
- B. Final Curing: Curing compounds complying with ASTM C309 may be used in accordance with recommendations of ACI 506.7, "Specification for Concrete." Provide additional curing immediately following initial curing and before patch material has dried. Use one of following materials or methods:
1. Continue method used in initial curing.

2. Material conforming to ASTM C171.
 3. Curing compounds conforming to ASTM C309.
 4. Other moisture retaining covering as approved by Engineer/Architect.
 5. Duration of Curing: Continue curing for first 7 days after patch placement. During initial and final curing periods maintain patch material above 50° F.
 6. Prevent rapid drying at end of curing period.
 7. Provide additional curing as required or recommended by manufacturer.
- C. Curing Compound (VOC Compliant, less than 350 g/l): Comply with ASTM C 309, Type 1, Class A or B. Moisture loss shall be not more than 0.55 kg/m² when applied at 200 sq. ft/gal. Manufacturer's certification is required. Silicate based compounds prohibited.
1. Subject to project requirements provide one of the following products:
 - a. "Kurez DR VOX" or "Kurez RC," or "Kurez RC Off," Euclid Chemical Company.
 - b. "RxCure WB," or "RxCure VOC" or "W.B. Cure VOC," Conspec Marketing & Manufacturing.
 - c. "MasterKure CC 200 WB" or "MasterKure CC 160 WB" BASF Construction Chemicals, LLC.
 - d. "MAPECURE DR", by MAPEI Corporation, Deerfield Beach, FL.
 2. Additional requirements:
 - a. With product submittal provide plan and procedures for removal of residual curing compound prior to application of sealers, coatings, stains, pavement markings and other finishes.
 - b. Provide a summary of testing to show adequate surface preparation for successful application of sealers, coatings, stains, pavement markings, and other finishes.

3.4 FIELD QUALITY CONTROL BY TESTING AGENCY

- A. Concrete Compressive Strength:
1. Mold test cubes in the field in accordance ASTM C-31 and ASTM C-109 as follows and further below:
 - a. Take a minimum of twelve (12), cubes for each 10 cu ft, or fraction thereof, of each repair mortar placed in any one day.
 - b. Use 2 in. x 2 in. cubes.
 - c. Additional 2 cubes shall be taken and field cured under conditions of cold weather concreting, and when directed by Engineer/Architect.
 - d. Cover specimens properly, immediately after finishing. Protect molds from contact with sources of water for first 24 hours after molding.
 2. Fabricate and cure test cubes per ASTM C-109, except as follows:

- a. Do not remove specimens from molds before 24 hours.
 - b. To verify 7 and 28-day compressive strengths:
 - 1) During first 24 hours after molding, store test specimens under conditions that maintain temperature immediately adjacent to specimens in range of 60 to 80° F. and prevent loss of moisture from specimens.
 - 2) Remove test specimens from molds at end of 24 hours and air dry in laboratory until moment of test.
 - c. To verify compressive strength of test cubes required due to cold weather concreting conditions:
 - 1) Store test specimens on structure as near to point of sampling as possible and protect from elements in same manner as that given to portion of structure as specimen represents.
 - 2) Transport to test laboratory no more than 4 hours before testing. Remove molds from specimens immediately before testing.
3. Compression Test:
- a. Test 3 cubes at 1 day (Mandatory).
 - b. Test 3 cubes at 7 days (Mandatory).
 - c. Test 3 cubes at 28 days (Mandatory).
 - d. Hold 3 cubes in reserve for use as Engineer/Architect directs.
4. Unless notified by Engineer/Architect, reserve cubes may be discarded without being tested after 56 days.

3.5 EVALUATION AND ACCEPTANCE OF TROWEL APPLIED MORTAR REPAIRS

A. Acceptance of Repairs (ACI 301):

- 1. Acceptance of completed concrete Work will be according to provisions of ACI 301.
- 2. Patched areas shall be sounded by Engineer/Architect and Contractor with hammer or rod after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
- 3. If shrinkage cracks appear in patch area when initial curing period is completed, patch shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.

END OF SECTION 033760

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SECTION 033761 – CAST IN PLACE REPAIR MORTAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, supervision and incidentals necessary to prepare deteriorated or damaged concrete surfaces and install concrete repair mortar to formed horizontal, vertical and overhead surfaces to restore original surface condition and integrity.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "Work Items."
 - 3. Division 02 Section "General Concrete Surface Preparation."
 - 4. Division 02 Section "Surface Preparation for Patching."
 - 5. Division 03 Section "Cast-In-Place Concrete - Restoration."
 - 6. Division 03 Section "Unbonded Post-Tensioned Concrete."
 - 7. Division 03 Section "Cast in Place Repair Mortar."
 - 8. Division 03 Section "Epoxy Injection Systems."
 - 9. Division 07 Section "Concrete Joint Sealants."
 - 10. Division 07 Section "Expansion Joint Assemblies."
 - 11. Division 07 Section "Water Repellents."
 - 12. Division 07 Section "Traffic Coatings."
 - 13. Division 09 Section "Pavement Marking."

1.3 QUALITY ASSURANCE

- A. Work shall conform to requirements of ACI 301 as applicable except where more stringent requirements are shown on Drawings or specified in this Section.
- B. Testing Agency:
 - 1. Independent testing laboratory employed by Owner and acceptable to Engineer.
 - 2. Accredited by AASHTO under ASTM C1077. Testing laboratory shall submit documented proof of ability to perform required tests.

- C. Sampling and testing of mortar shall be performed by ACI certified Concrete Field Technicians Grade I. Certification shall be no more than three years old.
- D. Testing Agency is responsible for conducting, monitoring and reporting results of all tests required under this Section. Testing Agency has authority to reject mortar not meeting Specifications.
- E. Testing Agency shall submit the following information for Field Testing of Concrete unless modified in writing by Engineer:
 - 1. Project name and location.
 - 2. Contractor's name.
 - 3. Testing Agency's name, address and phone number.
 - 4. Mortar manufacturer.
 - 5. Date of report.
 - 6. Testing Agency technician's name (sampling and testing).
 - 7. Placement location within structure.
 - 8. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
 - 9. Date, time, and place of test.
 - 10. Compressive test data:
 - a. Cube number.
 - b. Age of mortar when tested.
 - c. Date and time of cube test.
 - d. Compressive strength.

1.4 REFERENCES

- A. "Standard Specification for Structural Concrete" (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 - 1. "Building Code Requirements for Structural Concrete" (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 - 2. "Hot Weather Concreting" reported by ACI Committee 305.
 - 3. "Cold Weather Concreting" reported by ACI Committee 306.
 - 4. "Standard Specification for Curing Concrete" (ACI 308)
- C. Contractor shall have following ACI publications at Project construction site at all times:

1. "Standard Specifications for Structural Concrete (ACI 301) with Selected ACI and ASTM References," ACI Field Reference Manual, SP15.
 2. "Hot Weather Concreting" reported by ACI Committee 305.
 3. "Cold Weather Concreting" reported by ACI Committee 306.
- D. American Society for Testing and Materials (ASTM):
1. ASTM C109, "Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)."
 2. ASTM C31, "Test Method for Compressive Strength of Cylindrical Concrete Specimens."

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Contractor: At preconstruction meeting, submit procedures for demolition, surface preparation, material batching, placement, finishing, and curing of application. Provide procedure to protect fresh patches from severe weather conditions.
- C. Testing Agency: Promptly report all mortar test results to Engineer and Contractor. Include following information:
1. See Article "Quality Assurance," paragraph "Testing Agency shall submit...."
 2. Strength determined in accordance with ASTM C109.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to re-submittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Horizontal Repair Mortar: Shall be prepackaged, polymer-modified, cementitious repair mortar capable of horizontal pour and screed, form and pour, partial and full depth applications, achieving a minimum 3,000 psi compressive strength at 7 days and 5,000 psi compressive strength at 28 days per ASTM C109 if neat and ASTM C39 if extended as certified by manufacturer.
1. Acceptable materials for this Work are as follows:

- a. Polymer Modified or High Early Strength:
 - 1) "Sika Repair 222 with Latex R", by Sika Corporation, Lyndhurst, NJ.
 - 2) "LS-S6 or S10", or "LM-S6 or S10" by King Packaged Materials Company, Burlington, ON.
 - 3) "Quikrete 5000", by The QUIKRETE Companies, Atlanta, GA.
 - 4) "TOPCEM PREMIX with PLANITOP AC" by MAPEI Corporation, Deerfield Beach, FL.
- B. Rapid Strength Repair Mortar/Topping: Shall be prepackaged, silica-fume-modified, cementitious repair mortar containing integral corrosion inhibitor. Repair mortar shall be capable of cast-in-place horizontal application achieving a minimum 2,500 psi compressive strength at 1 day and 6,500 psi compressive strength at 28 days per ASTM C109 if neat and ASTM C39 if extended as certified by manufacturer with maximum lineal shrinkage of 0.10% at 28 days.
 1. Acceptable materials for this Work are as follows:
 - a. Silica fume modified:
 - 1) "MasterEmaco S 466 CI," by BASF Construction Chemicals, Shakopee, MN.
 - 2) "Eucocrete by The Euclid Chemical Company, Cleveland, OH.
 - 3) "HP-S6 or S10 Concrete", by King Packaged Materials Company, Burlington, ON
 - 4) "Planitop 11 SCC", by MAPEI Corporation, Deerfield Beach, FL.
- C. Thin Surface Patching Mortar: Polymer-modified, cementitious patching mortar achieving a minimum 3,000 psi compressive strength at 7 days and a minimum 5,000 psi compressive strength at 28 days of, per ASTM C 109. Neat application thickness (1/4" Minimum – 1" Maximum).
 1. Acceptable materials for this Work are as follows:
 - a. Polymer-modified:
 - 1) "MasterEmaco N 300 CI or MasterEmaco T 310 CI," by BASF Construction Chemicals, Shakopee, MN.
 - 2) "Thin-Top Supreme" or "Tammspatch II," by The Euclid Chemical Company, Cleveland, OH.
 - 3) "Concrete Resurfacer" by The QUIKRETE Companies, Atlanta, GA
 - 4) "SikaRepair 222 with Latex R," by Sika Corporation, Lyndhurst, NJ.
 - 5) "Planitop X" with "Planicrete AC" or "MAPECEM 102", by MAPEI, Deerfield Beach, FL

2.2 MATERIAL ACCESSORIES

- A. Extended Open Time Epoxy Bonding Agent: Three component, water based, epoxy modified Portland cement bonding agent and corrosion inhibitor coating providing the recommended Manufacturer's open time in which to apply repair mortar. Product shall be capable of achieving bond strength of 2,700 psi per ASTM C 882.
 - 1. Acceptable materials for this Work are:
 - a. "MasterEmaco P 124," by BASF Construction Chemicals, Shakopee, MN.
 - b. "Duralprep A.C.," by The Euclid Chemical Company, Cleveland, OH.
 - c. "Planibond 3-C" or Mapefer 1K," by Mapei Corporation, Deerfield Beach, FL.
 - d. "Sika Armatec 110 EpoCem", by Sika Corporation, Lyndhurst, NJ.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Preparation: Cavity surfaces shall be clean and dry prior to commencement of patch installation. Preparation of cavity to receive new mortar shall be in accordance with Section "Surface Preparation for Patching" and manufacturer's instructions.

3.2 INSTALLATION

- A. Repair Mortar Bonding Grout:
 - 1. Mix and apply repair/patching mortar bonding grout in strict accordance with manufacturer's recommendations.
 - 2. If repair/patching mortar bonding grout dries, cavity shall not be patched until it has been cleaned again and prepared as specified in Section "Surface Preparation for Patching." Repair mortar/patching grout shall not be applied to more cavities than can be patched within 0.25 hr by available manpower.
- B. Epoxy Bonding Agent (Extended Open Time):
 - 1. In strict accordance with manufacturer's recommendations, mix and apply epoxy bonding agent to all repair areas.
 - 2. Allow epoxy bonding agent to dry a minimum 2 hours, but no more than the Manufacturer's recommended open time prior to placing repair mortar.
- C. Mortar Placement: Mortar materials shall be placed immediately following repair/patching mortar bonding grout application in strict accordance with manufacturer's instructions. Properly proportioned and mixed mortar material shall be placed using tools to consolidate mortar so that no voids exist within new material

and continuous contact with base concrete is achieved. Fresh repair/patching mortar bonding grout is required between successive lifts of mortar material.

- D. Form and Pour Repair Mortar Placement: Mortar materials shall be placed [a minimum of 2 hours and no more than the Manufacturer's recommended open time after application of the extended open time epoxy bonding agent][immediately following the bonding grout application]. Mix and apply in strict accordance with manufacturer's written instructions, to achieve a maximum 9" slump.

3.3 CONCRETE PROTECTION AND CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during placement. Keep concrete continually moist prior to final curing by evaporation retarder, misting, sprinkling, or using absorptive mat or fabric covering kept continually moist.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.1 lb/sq. ft. x h before and during finishing operations. Apply material according to manufacturer's written instructions one or more times after placement, screeding and bull floating concrete, but prior to float finishing. Repeated applications are prohibited after float finishing has begun.
1. Acceptable evaporation retarder materials for this Work are:
 - a. "Cimfilm", by Axim Concrete Technologies.
 - b. "MasterKure ER 50", by BASF Construction Chemicals, Shakopee, MN.
 - c. "Aquafilm", by Conspec Marketing & Manufacturing Co., Inc.
 - d. "Sure-Film (J-74)", by Dayton Superior Corporation.
 - e. "Eucobar", or "Tamms Surface Retarder", by The Euclid Chemical Company, Cleveland, OH.
 - f. "E-Con", by L&M Construction Chemicals, Inc.
 - g. "EVRT", by Russ Tech Admixtures, Inc.
 - h. "SikaFilm", by Sika Corporation, Lyndhurst, NJ.
- C. Immediate upon conclusion of finishing operation cure concrete in accordance with ACI 308 for duration of at least seven days by moisture curing or moisture retaining covering. Provide additional curing immediately following initial curing and before concrete has dried.
1. Continue method used in initial curing.
 2. Material conforming to ASTM C171.
 3. Other moisture retaining covering as approved by Engineer.
 4. During initial and final curing periods maintain concrete above 50°.
 5. Prevent rapid drying at end of curing period.

- D. Concrete surfaces to receive slab coatings or penetrating sealers shall be cured with moisture curing or moisture-retaining cover.
- E. Dissipating Curing Compound [(VOC Compliant, less than 350 g/l)]: Comply with ASTM C 309, Type 1, Class A or B. Moisture loss shall be not more than 0.55 kg/m² when applied at 200 sq. ft/gal. Manufacturer's certification is required. Silicate based compounds are prohibited.
 - 1. Subject to project requirements provide one of the following products:
 - a. "Kurez DR VOX" or "Kurez RC," or "Kurez RC Off," The Euclid Chemical Company.
 - b. "RxCure WB," or "RxCure VOC" or "W.B. Cure VOC," Conspec Marketing & Manufacturing.
 - c. "MasterKure CC 160 WB" or "MasterKure CC 200 WB," BASF Construction Chemicals.
 - d. "MAPECURE DR", by MAPEI Corporation, Deerfield Beach, FL.
 - 2. Additional requirements:
 - a. With product submittal provide plan and procedures for removal of residual curing compound prior to application of sealers, coatings, stains, pavement markings and other finishes.
 - b. Provide a summary of testing to show adequate surface preparation for successful application of sealers, coatings, stains, pavement markings, and other finishes.
- F. Curing Methods: Cure formed and non-formed concrete moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.4 FIELD QUALITY CONTROL OF NON AGGREGATE EXTENDED MATERIAL

- A. Testing Agency: Owner shall engage a qualified independent testing and inspecting agency acceptable to the Engineer to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ASTM C109.
- B. Concrete Compressive Strength:
 - 1. Mold test cubes in accordance with ASTM C-109 as follows:
 - a. Take a minimum of twelve (12) cubes for each 10 cu ft, or fraction thereof, of each repair mortar placed in any one day. Use 2 in. x 2 in. cubes.
 - b. Additional 2 cubes shall be taken and field cured under conditions of cold weather concreting, and when directed by Engineer.
 - 2. Cover specimens properly, immediately after finishing. Protect molds from contact with sources of water for first 24 hours after molding.
 - 3. Fabricate and cure test cubes per ASTM C-109, except as follows:
 - a. Do not remove specimens from molds before 24 hours.
 - b. To verify mandatory 1, 7 and 28-day compressive strengths:
 - 1) During first 24 hours after molding, store test specimens under conditions that maintain temperature immediately adjacent to specimens in range of 60 to 80° F. and prevent loss of moisture from specimens.
 - 2) Remove test specimens from molds at end of 24 hours and air dry in laboratory until moment of test.
 - c. To verify compressive strength of test cubes required due to cold weather concreting conditions:
 - 1) Store test specimens on structure as near to point of sampling as possible and protect from elements in same manner as that given to portion of structure as specimen represents.
 - 2) Transport to test laboratory no more than 4 hours before testing. Remove molds from specimens immediately before testing.
 - 4. Compression Test:
 - a. Test 3 cubes at 1 day (Mandatory).
 - b. Test 3 cubes at 7 days (Mandatory).
 - c. Test 3 cubes at 28 days (Mandatory).
 - d. Hold 3 cubes in reserve for use as Engineer directs.
 - 5. Unless notified by Engineer, reserve cubes may be discarded without being tested after 56 days.

3.5 FIELD QUALITY CONTROL OF AGGREGATE EXTENDED MATERIAL

- A. Testing Agency: Owner shall engage a qualified independent testing and inspecting agency acceptable to the Engineer to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article. Perform tests according to ACI 301.
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - 2. Determine strength at 3, 7, and 28 days. Each test shall consist of two 6-inch diameter cylinders or three 4-inch diameter cylinders. Testing shall be in accordance with ASTM C39.

3.6 EVALUATION AND ACCEPTANCE OF WORK

- A. Acceptance of Repairs (ACI 301):
 - 1. Acceptance of completed concrete Work will be according to provisions of ACI 301.
 - 2. Repair areas shall be sounded by Engineer and Contractor with hammer or rod after curing for 72 hours. Contractor shall repair all hollowness detected by removing and replacing patch or affected area at no extra cost to Owner.
 - 3. If shrinkage cracks appear in repair area when initial curing period is completed, repair shall be considered defective, and it shall be removed and replaced by Contractor at no extra cost.

END OF SECTION 033761

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SECTION 033816 - UNBONDED POST-TENSIONED CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. In accordance with Contract Documents, provide all materials, labor, equipment, and supervision to fabricate and install all post-tensioning Work. Non-prestressed reinforcement shall conform to Division 03 Section, "Cast-in-Place Concrete."
- B. Meet the requirements of ACI 301, ACI 318, ACI 423.7, CRSI MSP-2, and Contract Documents. In case of a conflict, meet the more stringent requirement.
- C. Related work in other Sections related to Post-Tensioned Concrete:
 - 1. Division 01 Section "Project Management and Coordination."
 - 2. Division 02 Section "Surface Preparation for Patching."
 - 3. Division 03 Section "Cast-in-Place Concrete Restoration."
 - 4. Division 03 Section "Cast-in-Place Repair Mortar."
 - 5. Division 07 Section "Traffic Coatings."
 - 6. Division 07 Section "Water Repellants."
 - 7. Division 07 Section "Expansion Joint Assemblies."
 - 8. Division 07 Section "Concrete Joint Sealants."
 - 9. Division 07 Section "Pavement Marking."

1.3 REFERENCES

- A. Field Reference: Keep a copy of the following reference in the Contractor's field office.
 - 1. PTI's "Field Procedures Manual for Unbonded Single Strand Tendons"
- B. American Concrete Institute (ACI):
 - 1. ACI 301, "Specification for Structural Concrete."
 - 2. ACI 318, "Building Code Requirements for Structural Concrete."
 - 3. ACI 347, "Recommended Practice for Concrete Formwork."
 - 4. ACI 362.1R-97, "Guide for the Design of Durable Parking Structures."
 - 5. ACI 423.3R, "Recommendations for Concrete Members Prestressed with Unbonded Tendons."

6. ACI 423.7, "Specification for Unbonded Single-Strand Tendon Materials and Commentary."
- C. American Society for Testing and Materials (ASTM):
 1. ASTM A416, "Specification for Uncoated Seven-Wire Strand for Prestressed Concrete."
 2. ASTM E328, "Recommended Practice for Stress-Relaxation Tests for Materials and Structures."
- D. Concrete Reinforcing Steel Institute (CRSI):
 1. CRSI MSP-2, "Manual of Standard Practice."
- E. Post-Tensioning Institute (PTI):
 1. PTI, "Guide Specifications for Post-Tensioning Materials."
 2. PTI, "Performance Specification for Corrosion Preventive Coating."
 3. PTI, "Specification for Unbonded Single Strand Tendons."
 4. PTI, "Field Procedures Manual for Unbonded Single Strand Tendons."
- F. International Code Conference (ICC):
 1. ICC, "International Building Code."
 2. ICC, "International Building Code Standards."

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
 1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- B. Submittals and Resubmittals:
 1. Engineer will review each submittal the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made.
 2. Circle resubmittal changes/revisions/corrections. Engineer will review only circled items and will not be responsible for non-circled changes, revisions, corrections or additions.
 3. Should additional resubmittals be required, reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner will in turn reimburse Engineer.
- C. Requests For Information

1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
3. Do not use RFI process to request substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.5 ACTION SUBMITTALS

- A. Product Data: For each product as indicated.
1. Corrosion Inhibiting Coating: Type and chemical analysis.
 2. Sheathing: Type, material, density and thickness.
 3. Anchorage Device: Type, material and size.
 4. Coupler Device: Type, material and size.
 5. Pocket Former: Type, material and size.
 6. Sheathing Repair Tape: Type, material and width.
 7. Encapsulation System: Type and materials.
- B. Samples: For the following products:
1. Each anchorage assembly with a minimum of 24 inches of coated, sheathed strand.
 2. Each coupler assembly with a minimum of 24 inches of coated, sheathed strand.
 3. Encapsulation system.
- C. Stressing Records: Same day as stressing operation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Supplier and Installer using the forms at the end of this section.
- B. Mill Test Reports: Certified mill test reports for each coil or pack of strand used on Project, indicating that strand is low relaxation and including the following information:
1. Heat number and identification.
 2. Minimum breaking strength.
 3. Yield strength at 1 percent extension under load.
 4. Elongation at failure.
 5. Modulus of elasticity.
 6. Diameter and net area of strand.
- C. Test and Evaluation Reports: Indicating compliance with the following requirements:
1. Tests required by ACI 301, Section "Post-Tensioned Concrete."

2. Hydrostatic tests required by ACI 423.7 for "Anchorages and couplers in aggressive environments."
 3. Relaxation loss tests required by ACI 423.7 for low relaxation prestressing steel.
- D. Field Quality-Control Reports: Within 72 hours of inspection.
- E. Stressing Jack Calibration: Calibration certificates for jacks and gages to be used on Project. Calibrate each jack-and-gage set as a pair.
- F. Warranty: Proposed warranty prior to the start of construction.

1.7 QUALITY ASSURANCE

- A. Supplier Qualifications:
1. Use a fabricating plant certified by PTI.
 2. Successfully provided all materials for at least 5 post-tensioning installations in parking structures in the United States with a structural system similar to Project within the previous 5 years. Provide all information requested on the form at the end of this section.
- B. Installer Qualifications:
1. Certified by PTI.
 2. Successfully performed at least 5 post-tensioning installations in parking structures in the United States with a structural system similar to Project within the previous 5 years. Provide all information requested on the form at the end of this section.
 3. Use a full-time Project superintendent that has supervised at least 5 projects of similar magnitude.
 4. Use PTI Certified Field Installers to install and stress post-tensioning system.
- C. Prior to bid, Engineer/Architect will accept, tentatively accept, or reject Supplier or Installer based on compliance with criteria referenced in this section. Engineer/Architect's decision is final. Engineer/Architect may issue an addendum indicating accepted and tentatively accepted Suppliers prior to bid date. Engage only accepted or tentatively accepted Suppliers. Following a qualifications check, tentatively accepted Suppliers will be notified of acceptance or rejection at or before shop drawing stage. Contractor is responsible for delays due to such rejection.
- D. Comply with requirements in ACI 301, Section "Post-Tensioned Concrete."
- E. Perform all post-tensioning Work under the supervision of a Project Superintendent who is present during all operations including installation, concrete placement, stressing and finishing.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Assign all tendons in same member the same heat number and identify accordingly.
- B. Package each tendon bundle at source to prevent physical damage to tendon during transportation and storage, and to protect strand from moisture. Use heavy padding; cardboard is not permitted. Do not use wire binding or other materials that could cut the sheathing or tendon.
- C. Deliver, store and handle post-tensioning materials according to ACI 423.7.
- D. Immediately remove damaged components from Project site and replace at no cost to Owner.
- E. Do not remove sheathing on stressing end until the day of stressing.
- F. Materials Stored on Slabs:
 - 1. Prior to final stressing of beams and slabs, do not store any materials on slab.
 - 2. After final stressing of beams and slabs but before concrete has reached the specified 28 day strength, do not store materials on slab such that the weight exceeds 50 percent of the design live load.
 - 3. After final stressing of beams and slabs and concrete has reached the specified 28 day strength, do not store materials on slab such that the weight exceeds the design live load.

1.9 WARRANTY

- A. Provide a warranty from the Supplier that includes the following terms and provisions.
 - 1. Warranty period of 5 years beginning with the date of Beneficial Occupancy.
 - 2. Correct, at no expense to Owner, any defects that develop during the warranty period, which can be attributed to a defect in quality of product or workmanship.
 - 3. All materials have been manufactured in accordance with the Project specifications.
 - 4. Installation of materials, if under the control of the Supplier, has been according to the Project specifications.
 - 5. Supplier is not responsible for damage or liability caused by the actions or omissions of others.
- B. Provide a warranty from the Installer that includes the following terms and provisions.
 - 1. Warranty period of 5 years beginning with the date of acceptance of the repair.
 - 2. Correct, at no expense to Owner, any defects that develop during the warranty period, which can be attributed to a defect in quality of product or workmanship.

PART 2 - PRODUCTS

2.1 PRESTRESSING TENDONS

- A. Prestressing Strand: ASTM A416, Grade 270, uncoated, seven-wire, low-relaxation strand with minimum ultimate strength of 270 ksi.
 - 1. Manufactured by a single source.
 - 2. Strands manufactured outside United States subject to Engineer/Architect's approval based on evidence of satisfactory performance in the United States during the previous 5 years.
 - 3. Use of high stress bar system instead of strand system is not permitted unless accepted in writing by the Engineer.
 - 4. Conform to ACI 423.7 for relaxation loss requirements.
- B. Tendon Sheathing: Seamless and extruded high density polypropylene or seamless and extruded high density polyethylene with a specific gravity greater than 0.95 conforming to ACI 423.7.
 - 1. Sufficient strength to withstand damage during fabrication, transport, installation, concrete placement and stressing.
 - 2. Minimum thickness of 50 mils (-0 mils +15 mils)
 - 3. Minimum inside diameter 0.03 inches greater than maximum strand diameter.
 - 4. Chemically stable without becoming brittle or softening over anticipated temperature range and service life of structure.
 - 5. Non-reactive with concrete, steel and corrosion inhibiting coating.
 - 6. Contrasting color of corrosion inhibiting coating to enhance visibility of damage. Black/dark colored sheathing is not acceptable.
 - 7. Annular space between sheathing and strand completely filled with corrosion inhibiting coating.
 - 8. Watertight including all connections and components over entire length.
- C. Tendon Anchor: Non-porous casting free of sand, blow holes, voids and other defects meeting the testing and material requirements of ACI 423.7.
 - 1. Plastic coated bearing plates sized in accordance with ACI 423.7, unless certified test reports substantiate comparable or superior performance, for transfer at minimum stressing concrete strength.
 - 2. Capable of complying with PTI Guide Specification requirements for aggressive environments.
 - 3. Capable of developing at least 95% of the actual ultimate strength of tendon.
 - 4. Minimum wedge cavity opening of at least 0.19 inches larger than tendon diameter. Reaming of anchor wedge cavity is not permitted.
 - 5. Wedges capable of precluding failure of tendon due to notching or pinching effects during static and fatigue load tests stipulated in ACI 423.7.
 - 6. Provisions for a plastic cap which fits tightly and seals barrel end on stressing side of anchor.
 - 7. Provisions for a plastic sleeve which prevents moisture infiltration into anchor casting or tendon sheathing on bearing side of anchor.
- D. Coupler Assembly: Assembly of strands and wedges meeting the testing and material requirements of ACI 301.

1. Capable of complying with PTI Guide Specification requirements for aggressive environments.
 2. Capable of developing at least 95 percent of the ultimate strength of tendon.
 3. Wedges capable of precluding failure of tendon due to notching or pinching effects during static and fatigue load tests stipulated in ACI 423.7.
- E. Encapsulation System: Watertight encapsulation along the entire length of tendon, including anchorages and couplers, when subjected to hydrostatic testing required in ACI 423.7 for aggressive environments.
1. Sleeve: Translucent plastic with a positive mechanical connection to anchorages capable of resisting 100 lbs. pulling force. Minimum 10 inches long and 4 inches overlap with sheathing, completely filled with corrosion inhibiting coating.
 2. Anchor Cap: Translucent plastic with a positive mechanical connection to anchorages capable of resisting 100 lbs. pulling force. At intermediate anchorages, open to allow passage of strand.
 3. Subject to the requirements provide one of the following systems:
 - a. "Zero Void," General Technologies, Inc.
 - b. "Hayes Posi-Lock Plus," Hayes Industries, Ltd.
 - c. Accepted equivalent.

2.2 ACCESSORIES

- A. Pocket Formers: Capable of completely sealing wedge cavity from intrusion of concrete or cement slurry; sized to provide at least a 2 inch recess and allow access for cutting strand tail.
1. If Zero Void encapsulation system is used, the "Zero Void Nail-Less Pocket Former" is required.
- B. Anchorage Fasteners: Stainless-steel ring nails. Subject to the requirements use one of the following:
1. Clendenin Brothers, Baltimore, MD.
 2. Swan Secure Products, Baltimore, MD.
 3. R.J. Leahy Co., San Francisco, CA.
 4. Accepted equivalent.
- C. Sheathing Repair Tape: Elastic, self-adhesive, moisture-proof tape with a minimum width of 2 inches in contrasting color to tendon sheathing, and that is non-reactive with sheathing, corrosion inhibiting coating, or tendon. Subject to the requirements use one of the following:
1. "3M Tape No. 226," 3M, St. Paul, MN.
 2. "Polyken 826," Berry Plastics Corp, Evansville, IN
 3. "Tyco Adhesives No. 398," Tyco Adhesives, Franklin, MA

- D. Sheathing Repair Material: For nicks and cuts less than 0.25 inches use one of the following:
 - 1. "Scotch-Weld DP-8005," by 3M.
- E. Corrosion inhibiting coating: Capable of meeting the requirements of ACI 423.7. Subject to the requirements use one of the following
 - 1. "Greasrex K-218," ExxonMobil Oil Corp., Irving, TX.
 - 2. "Red-i PT Coating Grease," Lubricating Specialties Co., Pico Rivera, CA
 - 3. "Renolit PTG," Fuch's Lubricant Co., Harvey, IL
 - 4. "Royal PT-1 and PT-2 Corrosion Inhibiting Grease," Troco Oil Co., Tulsa, OK
- F. Tendon supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening tendons in place. Use tendon supports capable of meeting the requirements in CRSI's "Manual of Standard Practice" and as follows:
 - 1. Clearly marked to differentiate by height.
 - 2. Capable of resisting overturning during construction operations.
 - 3. Minimal contact with forms where concrete is exposed to view.
 - 4. Do not cause voids or damage to surrounding concrete.
 - 5. All-plastic supports conforming to CRSI Class 1 protection requirements and with a compressive strength higher than concrete.
 - 6. Acceptable manufacturers:
 - a. Aztec Concrete Accessories, Inc.
 - b. General Technologies, Inc.
 - c. Accepted equivalent.

2.3 GROUT MATERIALS

- A. Premixed, nonmetallic, noncorrosive, non-staining grout product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with ASTM C 1107, Grade B, with fluid consistency and a 30-minute working time.
- B. Non-reactive with prestressing strand, anchorage materials, or concrete and without chlorides or other chemicals known to be deleterious to prestressing strand.
- C. Subject to compliance with requirements, provide one of the following:
 - 1. Sure Grip Grout, Dayton Superior.
 - 2. Euco N.S., Euclid Chemical Co.
 - 3. Masterflow 928, BASF.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Provide formwork for post-tensioned elements as specified in Division 03 Section, "Cast-in-Place Concrete Restoration." Design formwork to support load redistribution that may occur during stressing operation. Ensure that formwork does not restrain elastic shortening, camber or deflection resulting from application of prestressing force.
- B. Do not remove forms supporting post-tensioned elements until tendons have been fully stressed and elongations have been approved by Engineer/Architect.

3.2 TENDON INSTALLATION

- A. Tendon Supports:
 - 1. Support slab tendons independently of beam reinforcement.
 - 2. Position supports at high and low points and at intervals not exceeding 48 inches.
 - 3. Support tendons as required to provide the specified profile and prevent displacement during subsequent construction operations.
- B. Anchors:
 - 1. Install anchors perpendicular to tendon axis.
 - 2. Install tendons straight, without vertical or horizontal curvature, for a minimum of 12 inches behind stressing-end and intermediate anchors.
 - 3. Attach stressing-end anchors securely to bulkhead forms to prevent loosening due to construction activity or during concrete placement.
- C. Tendon Protection:
 - 1. Protect tendons from moisture and corrosion prior to concrete placement.
 - 2. Protect exposed tendons from moisture and corrosion at all times.
 - 3. Bare tendons are not permitted at any time.
 - 4. Do not cut or remove sheathing before concrete is placed.
- D. Welding is prohibited unless shown on the drawings or accepted in writing by the Engineer.

3.3 SHEATHING INSPECTION AND REPAIR

- A. Inspect sheathing for damage after installing tendons and before placing concrete.
- B. Remove and replace tendons that have damaged encapsulation systems including sheathing tears or cuts over 10 percent of the length (damage need not be continuous), sheathing withdrawn from connecting sleeves, or connecting sleeves withdrawn from fixed end anchorages.

- C. Repair damaged areas by restoring corrosion inhibiting coating and repairing sheathing according to the following procedure to the satisfaction of the Engineer/Architect.
 - 1. Coat with corrosion inhibiting coating outside of sheathing for the length of damaged area plus 2 inches beyond each end of damage. For example, if sheathing tear is 6 inches long then corrosion inhibiting coated area will be 10 inches long, centered on tear.
 - 2. Install longitudinally slit sheathing around corrosion inhibiting coating area with the slit on the side opposite the tear. Extend slit sheathing 2 inches beyond corrosion inhibiting coating area at each end. For example, if corrosion inhibiting coating area is 10 inches long, then the slit sheathing will be 14 inches long, centered on tear.
 - 3. After removing corrosion inhibiting coating from the area to be taped, spirally wrap tape around slit sheathing to provide at least 2 layers of tape. Extend tape 2 inches beyond slit sheathing at each end. For example, if slit sheathing is 14 inches long, then taped area will be 18 inches long, centered on tear.
- D. Repair nick and cuts less than 0.25 inches long with sheathing repair material.

3.4 TENDON STRESSING

- A. Calibrate stressing jacks and gages at least every 6 months and keep copies of certificates on site and available for inspection.
- B. Use stressing jacks that are equipped with pressure gages to permit stress in the tendon to be computed at any time.
- C. Begin stressing operations as soon as concrete strength reaches 3,000 psi.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency approved by Engineer/Architect to perform tests and inspections. Testing agency has authority to reject work not conforming to the Contract Documents.
- B. Before concrete placement, testing agency will inspect the following for compliance with the Contract Documents and accepted Installation Drawings.
 - 1. Location and number of tendons.
 - 2. Tendon size and grade.
 - 3. Tendon profile and cover.
 - 4. Sheathing type, thickness, damage and repair.
 - 5. Corrosion inhibiting coating.
 - 6. Anchorages, sleeves and accessories.
 - 7. Support methods.
 - 8. Encapsulation system.

- C. During stressing operations testing agency will record the following and promptly submit to Engineer/Architect upon completion of stressing operations each day.
 - 1. Calculated tendon elongation based on actual modulus of elasticity and cross-sectional area of tendons used.
 - 2. Actual elongation measured for each tendon.
 - 3. Gage pressure required to achieve required stressing force (per calibration chart) for each tendon.
 - 4. Actual gage pressure for each tendon.
 - 5. Required concrete strength at time of stressing.
 - 6. Reported concrete strength at time of stressing.
 - 7. Range of allowable elongations for stressing force.
 - 8. Jack and gage identification numbers.
 - 9. Installer certification that stressing process and records have been reviewed and that forces specified have been provided.
- D. After stressing operations testing agency will inspect the following for compliance with the Contract Documents.
 - 1. Tendon end length.
 - 2. Anchor caps with grease.
 - 3. Cleaning and grouting of pockets.
- E. Testing agency will prepare test and inspections reports in an accepted format. In addition to test and inspection data, include the following.
 - 1. Project name and location.
 - 2. Date and time of inspection.
 - 3. Inspection location within the structure.
 - 4. Air temperatures, weather and wind speed.
 - 5. Testing agency's name, address and phone number.
 - 6. Testing agency's technician's name.
 - 7. Installer's name.

3.6 REPAIRS

- A. Submit repair procedures to Engineer/Architect for acceptance prior to starting repairs.
- B. Complete all required repairs at no cost to Owner.

END OF SECTION 033816

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POST-TENSIONING SUPPLIER QUALIFICATION FORM

GENERAL INFORMATION:	
Project:	City:
Supplier:	
General Contractor:	

SAMPLE PROJECT #1	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #2	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING SUPPLIER QUALIFICATION FORM

SAMPLE PROJECT #3	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #4	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING SUPPLIER QUALIFICATION FORM

SAMPLE PROJECT #5	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

REQUIRED ATTACHMENTS	
	Quality plan for manufacture, delivery, and detailing of post-tensioning system.
	Verification letter stating that the post-tensioning system will be manufactured in a plant with a current PTI certification and that all materials conform with ACI 301, ACI 318, and are approved by the International Code Council (International Building Code.)

POST-TENSIONING INSTALLER QUALIFICATION FORM

GENERAL INFORMATION:	
Project:	City:
Installer:	
General Contractor:	

SAMPLE PROJECT #1	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #2	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING INSTALLER QUALIFICATION FORM

SAMPLE PROJECT #3	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

SAMPLE PROJECT #4	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

POST-TENSIONING INSTALLER QUALIFICATION FORM

SAMPLE PROJECT #5	Date Completed:
Project Name:	\$ Value of PT Sub-contract:
City and State:	Tonnage of PT tendons:
Engineer of Record	General Contractor
Name:	Project Manager:
Firm:	Firm:
Phone Number:	Phone Number:
Email:	Email:

REQUIRED ATTACHMENTS	
	Resume of Project Superintendent indicating required experience.
	Letter from post-tensioning Supplier accepting Installer.
	Verification letter stating that the Installer has a current PTI certification and that PTI Certified Field Installers will be used to install and stress post-tensioning system.

POST-TENSIONING INSTALLER QUALIFICATION FORM

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SECTION 036300 - EPOXY INJECTION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes the provision of all labor, materials, equipment, supervision and incidentals necessary to prepare cracks in structural concrete members and inject them with a 2-component, moisture-insensitive, 100 percent solids, low-viscosity epoxy resin system.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "Work Items."
 - 3. Division 02 Section "General Concrete Surface Preparation."
 - 4. Division 02 Section "Surface Preparation for Patching."

1.3 QUALITY ASSURANCE

- A. Testing Agency will be independent testing laboratory employed by Owner and approved by Engineer/Architect.
- B. Testing Agency is responsible for conducting, monitoring and reporting to Owner results of all field tests of epoxy injection and installation required under this Section with copy of all reports to Engineer and Contractor.
- C. Submit following information for Field Testing of Epoxy Injection Installation unless modified in writing by Engineer/Architect:
 - 1. Project name and location.
 - 2. Contractor's name.
 - 3. Testing Agency's name, address and phone number.
 - 4. Epoxy material supplier.
 - 5. Date of report.
 - 6. Testing Agency technician's name (sampling and testing).
 - 7. Placement location within structure.
 - 8. Epoxy material data:
 - a. Epoxy type.

- b. Gel type.
 - c. Width of cracks injected (if applicable).
 - d. Crack conditions (dry or wet).
 - e. Injection port spacing.
 - f. Initial and (if different) constant injection pressures.
 - g. Use rate of epoxy.
 - 9. Weather data:
 - a. Air temperatures.
 - b. Weather.
 - c. Wind speed.
 - 10. Field test data:
 - a. Date, time and place of test.
 - b. Thickness of epoxy in crack or void.
- D. Qualifications:
 - 1. Contractor Qualifications: Contractor shall be qualified in the field of concrete repair and protection with a minimum of 5 years experience in application of similar systems and products on projects of similar size and scope.
 - a. Successful completion of a minimum of 3 projects of similar size and complexity to specified Work.
 - b. Contractor shall maintain qualified personnel who have received product training by a manufacturer's representative.
 - c. Install materials in accordance with all safety and weather conditions required by the manufacturer, or as modified by applicable rules and regulations of local, state, and federal authorities having jurisdiction.
 - 2. Manufacturer Qualifications: The manufacturer of the specified product shall be ISO 9001:2000 Certified and have in existence a recognized ongoing quality assurance program independently audited on a regular basis. The manufacturer shall have a minimum 15 years of experience in manufacturing of surface hardener.
- E. Pre-Construction Meetings: Conduct Pre-Construction meeting at Project site to comply with requirements of Division 01 and as specified in this Section.
 - 1. Schedule and convene meeting a minimum of 1 week prior to commencing Work of this Section.
 - 2. Review requirements for application, including surface preparation specified under other Sections, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details, installation procedures, testing and inspection procedures, protection, and repair.
 - 3. Discuss procedures for protecting adjacent finished Work.

1.4 REFERENCES

- A. "Standard Specifications for Structural Concrete," (ACI 301) by American Concrete Institute, herein referred to as ACI 301, is included in total as specification for this structure except as otherwise specified herein.
- B. Comply with provisions of following codes, specifications and standards except where more stringent requirements are shown on Drawings or specified herein:
 - 1. "Building Code Requirements for Reinforced Concrete," (ACI 318), American Concrete Institute, herein referred to as ACI 318.
 - 2. "Causes, Evaluation, and Repair of Cracks in Concrete Structures" (ACI 224.112), American Concrete Institute.
 - 3. "State-of-the-Art Report on Parking Structures" (ACI 326), American Concrete Institute.
 - 4. "Use of Epoxy Compounds with Concrete" (ACI 503), American Concrete Institute.
 - 5. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.
 - 6. "Guide for Repair of Concrete Bridge Superstructures" Reported by ACI Committee 546 (ACI 546.1).
- C. Contractor shall have following ACI publications at Project construction site at all times:
 - 1. "Use of Epoxy Compounds with Concrete" (ACI 503), American Concrete Institute.
 - 2. "Standard Specification for Bonding Hardened Concrete, Steel, Wood, Brick, and Other Materials to Hardened Concrete with a Multi-Component Epoxy Adhesive" (ACI 503.1), American Concrete Institute.

1.5 SUBMITTALS

- A. Make submittals in accordance with requirements of Division 01 and as specified in this Section.
- B. Contractor: Submit manufacturer's product data sheets, technical sheets, recommended application procedures and information on epoxy injection equipment.
- C. Testing Agency: Promptly report all test results to Engineer/Architect and Contractor. Include following information:
 - 1. See Article "Quality Assurance," paragraph "Submit following information for Field Testing...."
 - 2. Visual examination of epoxy resin penetration.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.

- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.6 WARRANTY

- A. System manufacturer and Contractor shall furnish Owner written single source performance guarantee that epoxy resin injection system will be free of defects related to design, workmanship or material deficiency for 3-year period from date of acceptance of Work required under this Section against leakage or bond failure:
 - 1. Any adhesive or cohesive failure.
 - 2. Cracking or other weathering deficiency.
 - 3. Normal abrasion or tear failure.
- B. Any repair under this guarantee shall be done at no cost to Owner. Guarantee shall be provided by Contractor and manufacturer of system.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Injection epoxy shall be one of following:
 - 1. "MasterInject 1380" or "MasterInject 1500" as manufactured by BASF Construction Chemicals., Shakopee, MN.
 - 2. "Sikadur 35 Hi-Mod LV" or "Sikadur 52" as manufactured by Sika Chemical Corporation, Lyndhurst, NJ.
 - 3. "Epoxy HP-LV" as manufactured by Hunt Process Corp-Southern, Ridgeland, MS.
 - 4. "Pro-Poxy 50 Super LV" as manufactured by Unitex, Kansas City, MO.
 - 5. "Eucopoxy" or "Duralcrete LV" as manufactured by The Euclid Chemical Company, Cleveland OH.
 - 6. "Sure Inject J56 SLV" as manufactured by Dayton Superior Corp., Miamisburg OH.
 - 7. "KonTek 11 LV" as manufactured by Contech Group, Inc. Seattle, WA.
 - 8. "Kemko 038" as manufactured by ChemCo Systems, Inc., Redwood City, CA.
- B. Epoxy gel shall be as specified by the selected injection epoxy manufacturer.
- C. Equipment:
 - 1. Epoxy injection unit shall be portable and equipped with positive displacement-type pumps with interlock to provide positive ration control of epoxy injection resin components. Pumps shall be air or electric powered and shall provide in-line mixing and metering system and shall be equipped with drain-back plugs.
 - 2. Equipment used to inject epoxy shall be capable of following:

- a. Automatic proportioning of materials within mix ratio tolerances set by epoxy resin manufacturer.
- b. Delivery of components, resin and hardeners, from separate reservoirs to mixing type discharge head.
- c. Complete and uniform mixing of components at discharge head.
- d. Injection of resin system at constant pressures not to exceed 150 psi.

PART 3 - EXECUTION

3.1 PREPARATION

A. Crack Identification:

1. All cracks 0.03 in. wide or greater that are designated by Engineer/Architect, and not coincident with principal delamination, shall be injected. Cracks that occur coincident with principal delaminations shall not be injected.
2. Cracks requiring repair shall be located by Contractor at time of construction and marked with chalk.

B. Crack Preparation for Injection:

1. Surface of concrete adjacent to crack must be free of all laitance, efflorescence, dirt or foreign particles.
2. Cracks may be damp or dry as per injection material manufacturer's recommended installation procedures.
3. All cracks shall be properly sealed along their exposed length with an approved epoxy gel.
4. Epoxy injection ports shall be uniformly spaced along crack and shall be installed as recommended by system manufacturer. If concrete member being injected is exposed on both sides, provide injection ports on opposite sides at staggered intervals.
5. Apply epoxy gel around injection port to provide an adequate seal to prevent escape of injection resin from perimeter of port while under pressure.
6. Apply epoxy gel for sealing in manner that will result in minimal defacing or disorganization of concrete substrate.

3.2 INSTALLATION

A. Epoxy Injection:

1. Dispense epoxy injection resin under constant pressure in accordance with manufacturer's recommended procedures or as required to achieve maximum filling and penetration of crack without inclusion of air voids in epoxy resin material.
2. Injection shall begin at lowest port and progress incrementally higher.
3. Appearance of epoxy resin at next higher port shall be considered evidence of successful crack filling.

4. If penetration of epoxy resin into cracks is not possible, notify Engineer/Architect prior to discontinuing injection procedures. If alternate injection procedures are possible, submit procedure in writing to Engineer/Architect for review.
5. Contractor shall adhere to all limitations and cautions for epoxy resin injection material as per manufacturer's current printed literature.

B. Cleaning:

1. When cracks are completely filled, allow adhesive to cure for sufficient time to allow the removal of the surface seal without any draining or runback of epoxy material from the cracks.
2. Remove the surface seal material, ports, and injection adhesive runs or spills from concrete surfaces.
3. Finish the face of the crack flush to the adjacent concrete, removing any indentations or protrusions caused by the placement of entry ports.
4. Match work area to adjacent surface including any surface treatments.

3.3 FIELD QUALITY CONTROL BY TESTING AGENCY

A. Core Testing:

1. Testing Agency shall obtain 3- 2 in. minimum diameter core samples in first 100 ft of repaired cracks and 1 core for each 100 ft thereafter. Cores shall be taken after injection resin has cured for period of 7 days. Core sample shall be for full crack depth. Core locations and sizes shall be submitted to Engineer/Architect for review prior to taking core samples. Care should be taken not to damage or cut existing reinforcement (ESPECIALLY POST-TENSIONING TENDONS).
2. Core samples shall be visually examined to determine degree of epoxy penetration. Minimum of 90% of crack shall be full of epoxy adhesive.

B. Evaluation and Acceptance of Epoxy Injection:

1. Results of visual examination will be reviewed by Engineer/Architect for compliance with Article "Field Quality Control by Testing Agency," paragraph "Core Testing."
2. If results of initial cores fail by lack of penetration, work shall not proceed further until area represented by cores has been re-injected and re-tested for acceptance.
3. After cracks have been re-injected, additional cores shall be taken as directed by Engineer/Architect. Cores shall be tested for compliance with Article "Field Quality Control by Testing Agency," paragraph "Core Testing" by Owner's Testing Agency at Contractor's expense.
4. Core holes shall be filled with non-shrink grout material. Grout shall be applied with hard trowel, and be thoroughly rodded and tamped in place. Finish, texture and color to match existing surface. Materials and procedures for filling testing core holes shall be submitted to Engineer/Architect for review prior to starting work.

C. Acceptance of Structure:

1. Acceptance of completed concrete injection work will be according to requirements of Article "Field Quality Control by Testing Agency," paragraph "Core Testing."
2. Grouted core holes shall be sounded by Engineer/Architect and Contractor with hammer or rod after curing for 48 hours.

END OF SECTION 036300

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SECTION 040120 - MAINTENANCE OF UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes maintenance of unit masonry consisting of brick clay masonry restoration and cleaning as follows:
 - 1. Unused anchor removal.
 - 2. Repairing unit masonry, including replacing units.
 - 3. Painting steel uncovered during the work.
 - 4. Reanchoring veneers.
 - 5. Repointing joints.
 - 6. Preliminary cleaning, including removing plant growth.
 - 7. Cleaning exposed unit masonry surfaces.
- B. Owner-Furnished Material: Salvaged brick.
- C. Related Sections:
 - 1. Section 042010 "Unit Masonry" for new clay masonry construction.
 - 2. Section 071900 "Water Repellents" for water repellents applied to clay masonry.
 - 3. Section 079236 "Architectural Joint Sealants."

1.3 DEFINITIONS

- A. Very Low-Pressure Spray: Under 100 psi.
- B. Low-Pressure Spray: 100 to 400 psi; 4 to 6 gpm.
- C. Medium-Pressure Spray: 400 to 800 psi; 4 to 6 gpm.
- D. High-Pressure Spray: 800 to 1200 psi; 4 to 6 gpm.
- E. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.
- B. Samples for Initial Selection: For the following:
 - 1. Pointing Mortar: Submit sets of mortar for pointing in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.
 - a. Have each set contain a close color range of at least six samples of different mixes of colored sands and cements that produce a mortar matching the cleaned masonry when cured and dry.
 - b. Submit with precise measurements on ingredients, proportions, gradations, and sources of colored sands from which each Sample was made.
 - 2. Sealant Materials: See Section 079236 "Architectural Joint Sealants."
 - 3. Include similar Samples of accessories involving color selection.
- C. Samples for Verification: For the following:
 - 1. Each type of masonry unit to be used for replacing existing units. Include sets of Samples as necessary to show the full range of shape, color, and texture to be expected.
 - a. For each brick type, provide straps or panels containing at least four bricks. Include multiple straps for brick with a wide range.
 - 2. Each type of sand used for pointing mortar; minimum **1 lb** of each in plastic screw-top jars.
 - a. For blended sands, provide Samples of each component and blend.
 - b. Identify sources, both supplier and quarry, of each type of sand.
 - 3. Each type, color, and texture of pointing mortar in the form of sample mortar strips, 6 inches long by 1/2 inch wide, set in aluminum or plastic channels.
 - a. Include with each Sample a list of ingredients with proportions of each. Identify sources, both supplier and quarry, of each type of sand and brand names of cementitious materials and pigments if any.
 - 4. Sealant Materials: See Section 079236 "Architectural Joint Sealants."
 - 5. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.5 QUALITY ASSURANCE

- A. Restoration Specialist Qualifications: Engage an experienced, preapproved masonry restoration and cleaning firm to perform work of this Section. Firm shall have

completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.

1. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
 2. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of restoration specialist firm.
 3. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing.
- B. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.
- C. Quality-Control Program: Prepare a written quality-control program for this Project to systematically demonstrate the ability of personnel to properly follow methods and use materials and tools without damaging masonry. Include provisions for supervising performance and preventing damage due to worker fatigue.
- D. Restoration Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials and Project site.
1. Include methods for keeping pointing mortar damp during curing period.
 2. If materials and methods other than those indicated are proposed for any phase of restoration work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.
- E. Cleaning Program: Prepare a written cleaning program that describes cleaning process in detail, including materials, methods, and equipment to be used, protection of surrounding materials, and control of runoff during operations.
1. If materials and methods other than those indicated are proposed for any phase of restoration work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.
- F. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 50 feet away by Architect. Perform additional paint and stain removal, general cleaning, and spot cleaning of small areas that are noticeably different, so that surface blends smoothly into surrounding areas.

- G. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than 2 adjacent whole units or approximately 48 inches in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - a. Replacement:
 - 1) Four brick units replaced.
 2. Repointing: Rake out joints in 2 separate areas each approximately 36 inches high by 48 inches wide as indicated for each type of repointing required and repoint one of the areas.
 3. Cleaning: Clean an area approximately 25 sq. ft. for each type of masonry and surface condition.
 - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have deleterious effect.
 - b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.
 4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.
- B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- D. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- E. Store lime putty covered with water in sealed containers.

- F. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.
- B. Repair masonry units and repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least 7 days after completion of the Work unless otherwise indicated.
- C. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing unless otherwise indicated:
 - 1. When air temperature is below 40 deg F, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
 - 2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repair and pointing.
- D. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.
- E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
- F. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.8 COORDINATION

- A. Coordinate masonry restoration and cleaning with public circulation patterns at Project site. Some work is near public circulation patterns. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Plan and execute the Work accordingly.

1.9 SEQUENCING AND SCHEDULING

- A. Order replacement materials at earliest possible date to avoid delaying completion of the Work.

- B. Perform masonry restoration work in the following sequence:
1. Remove plant growth.
 2. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 3. Remove paint.
 4. Clean masonry surfaces.
 5. Where water repellents, specified in Section 071900 "Water Repellents," are to be used on or near masonry work, delay application of these chemicals until after pointing.
 6. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
 7. Repair masonry, including replacing existing masonry with new masonry materials.
 8. Rake out mortar from joints to be repointed.
 9. Point mortar joints.
 10. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.
 11. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.
 12. Remove paint.
 13. Clean masonry surfaces.
- C. As scaffolding is removed, patch anchor holes used to attach scaffolding.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

- A. Face Brick: Provide face brick, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work.
1. Provide units with colors, color variation within units, surface texture, size, and shape to match existing brickwork as selected by Architect and with physical properties as listed below:
 - a. ASTM C 216, Grade SW, Type FBS.
 - b. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.

- B. Hydrated Lime: ASTM C 207, Type S.
- C. Factory-Prepared Lime Putty: ASTM C 1489.
- D. Mortar Sand: ASTM C 144 unless otherwise indicated.
 - 1. For pointing mortar, provide sand with rounded edges.
 - 2. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
- E. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- F. Water: Potable.

2.3 CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.
- D. Job-Mixed Mold, Mildew, and Algae Remover: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.

2.4 ACCESSORY MATERIALS

- A. Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of 1/4-inch diameter, Type 316 stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BLOK-LOK Limited; Torg-Lok.
 - b. Dur-O-Wal, a division of Dayton Superior; Dur-O-Wal Repair Anchor.
 - c. Hohmann & Barnard, Inc.; #521RA-B Restoration Anchor.
- B. Masonry Repair Anchors, Spiral Type: Type 316 stainless-steel spiral rods designed to anchor to backing and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.

1. Provide adhesive-installed anchors complete with manufacturer's standard epoxy adhesive and injection tubes, or other devices required for installation.
 2. Provide driven-in anchors designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer.
 3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BLOK-LOK Limited; Spira-Lok.
 - b. Dur-O-Wal, a division of Dayton Superior; Dur-O-Pair Resin Anchor or Dur-O-Flex Friction Pin Anchor.
 - c. Heckmann Building Products Inc.; #391 Remedial Tie.
 - d. Hohmann & Barnard, Inc.; Helix Spiro-Ties.
- C. Masonry Repair Anchors, Rod/Screen Tube Type: Stainless-steel screen tube with or without Type 316 stainless-steel rod, adhesive installed by injection with manufacturer's standard epoxy adhesive, complete with other devices required for installation.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BLOK-LOK Limited; Chem-Lok.
 - b. Hohmann & Barnard, Inc.; #520RA.
- D. Sealant Materials:
1. Provide manufacturer's standard chemically curing, elastomeric sealant(s) of base polymer and characteristics complying with Section 079236 "Architectural Joint Sealants."
- E. Joint-Sealant Backing:
1. Cylindrical Sealant Backings: See Section 079236 "Architectural Joint Sealants."
 2. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where acceptable.

2.5 MORTAR MIXES

- A. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
1. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use

mortar within one hour of final mixing; do not retemper or use partially hardened material.

- B. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.
 - 1. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
- C. Do not use admixtures in mortar unless otherwise indicated.
- D. Mortar Proportions: Mix mortar materials in the following proportions:
 - 1. Pointing Mortar for Brick: 1 part portland cement, 2 parts lime, and 6 parts sand.
 - a. Add mortar pigments to produce mortar colors required.
 - 2. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
 - 1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
- B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.
 - 1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - 2. Keep wall wet below area being cleaned to prevent streaking from runoff.
 - 3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.

4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- C. Prevent mortar from staining face of surrounding masonry and other surfaces.
1. Cover sills, ledges, and projections to protect from mortar droppings.
 2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 3. Immediately remove mortar in contact with exposed masonry and other surfaces.
 4. Clean mortar splatters from scaffolding at end of each day.
- D. Remove downspouts adjacent to masonry and store during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning are complete.

3.2 BRICK REMOVAL AND REPLACEMENT

- A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
1. When removing single bricks, remove material from center of brick and work toward outside edges.
- B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
- C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
- D. Remove in an undamaged condition as many whole bricks as possible.
1. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 2. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 3. Store brick for reuse. Store off ground, on skids, and protected from weather.
 4. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.
- E. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F. Replace removed damaged brick with other removed brick and salvaged brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.

- G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 - 2. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
 - 3. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.3 UNUSED ANCHOR REMOVAL

- A. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
 - 1. Remove items carefully to avoid spalling or cracking masonry.
 - 2. Where directed, if an item cannot be removed without damaging surrounding masonry, do the following:
 - a. Cut or grind off item approximately 3/4 inch beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
 - b. Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
 - 3. Patch the hole where each item was removed unless directed to remove and replace the masonry unit.

3.4 REANCHORING VENEERS

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than 16 inches o.c. vertically and 32 inches o.c. horizontally unless otherwise indicated. Install at locations to avoid penetrating flashing.

- B. Recess anchors at least 5/8 inch from surface of mortar joint and fill recess with pointing mortar.

3.5 PAINTING STEEL UNCOVERED DURING THE WORK

- A. Inspect steel exposed during masonry removal. Where Architect determines that it is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
 - 1. Remove paint, rust, and other contaminants according to SSPC-SP 3, "Power Tool Cleaning", as applicable to meet paint manufacturer's recommended preparation.
 - 2. Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
- B. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.6 WIDENING JOINTS

- A. Do not widen a joint, except where indicated or approved by Architect.
- B. Location Guideline: Where an existing masonry unit abuts another or the joint is less than 1/8 inch, widen the joint for length indicated and to depth required for repointing after obtaining Architect's approval.
- C. Carefully perform widening by cutting, grinding, routing, or filing procedures demonstrated in an approved mockup.
- D. Widen joint to width equal to or less than predominant width of other joints on building. Make sides of widened joint uniform and parallel. Ensure that edges of units along widened joint are in alignment with joint edges at unaltered joints.

3.7 CLEANING MASONRY, GENERAL

- A. Proceed with cleaning in an orderly manner; work from bottom to top of each scaffold width and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
- B. Use only those cleaning methods indicated for each masonry material and location.
 - 1. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry.
 - a. Equip units with pressure gages.

2. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 3. For medium-pressure water-spray application, use fan-shaped spray tip that disperses water at an angle of at least 40 degrees.
 4. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
- D. Water Application Methods:
1. Water-Spray Applications: Unless otherwise indicated, hold spray nozzle at least 6 inches from surface of masonry and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- E. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.8 PRELIMINARY CLEANING

- A. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.
- B. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, caulking, asphalt, and tar.
1. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
 2. Remove paint and caulking with alkaline paint remover.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Repeat application up to two times if needed.

3.9 CLEANING BRICKWORK

- A. Hot-Water Wash: Use hot water applied by **medium**-pressure spray.
- B. Detergent Cleaning:
1. Wet masonry with hot water applied by low-pressure spray.
 2. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to

- remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
3. Rinse with **hot** water applied by medium-pressure spray to remove detergent solution and soil.
 4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

C. Mold, Mildew, and Algae Removal:

1. Wet masonry with hot water applied by low-pressure spray.
2. Apply mold, mildew, and algae remover by brush or low-pressure spray.
3. Scrub masonry with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that masonry surface remains wet.
4. Rinse with hot water applied by medium-pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

3.10 REPOINTING MASONRY

A. Rake out and repoint joints to the following extent:

1. All joints in areas indicated.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade 0.027 inch thick.
4. Cracked joints where cracks are 1/16 inch or more in width and of any depth.
5. Joints where they sound hollow when tapped by metal object.
6. Joints where they are worn back 1/4 inch or more from surface.
7. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
8. Joints where they have been filled with substances other than mortar.
9. Joints indicated as sealant-filled joints.

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Remove mortar from joints to depth of 2 times joint width, but not less than 1/2 inch or not less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
3. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.

- a. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.
- D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
- E. Pointing with Mortar:
 1. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
 2. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 3. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
 4. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
 5. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
 - a. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 - b. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
 6. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
- F. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.
- G. Pointing with Sealant:
 1. After raking out, keep joints dry and free of mortar and debris.
 2. Clean and prepare joint surfaces according to Section 079236 "Architectural Joint Sealants." Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
 3. Fill sealant joints with specified joint sealant according to Section 079236 "Architectural Joint Sealants" and the following:

- a. Install cylindrical sealant backing beneath the sealant, except where space is insufficient. There, install bond-breaker tape.
 - b. Install sealant using only proven installation techniques that will ensure that sealant will be deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
 - c. Install sealant as recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
 - 1) Fill joints to a depth equal to joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.
 - d. Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
 - e. Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.
4. Cure sealant according to Section 079236 "Architectural Joint Sealants."

3.11 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
 1. Do not use metal scrapers or brushes.
 2. Do not use acidic or alkaline cleaners.
- B. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

3.12 FIELD QUALITY CONTROL

- A. Inspectors: Owner will engage qualified independent inspectors to perform inspections and prepare test reports. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
- C. Notify Architect in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Architect's have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 040120

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SECTION 042010 – UNIT MASONRY

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Comply with ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS

- A. Concrete Masonry Units: ASTM C 90; normal weight, match existing.
 - 1. Special shapes for lintels, corners, jambs, sash, control joints, and other special conditions.
 - 2. Square-edged units for outside corners, unless otherwise indicated.
- B. Decorative Concrete Masonry Units: ASTM C 90; Weight Classification, to match existing.
- C. Face Brick: ASTM C 216, Grade SW, Type FBS.
 - 1. Match size, shape, and color of existing units.

2.2 MORTAR

- A. Mortar: ASTM C 270, Proportion Specification, for job-mixed mortar; and ASTM C 1142 for ready-mixed mortar.
 - 1. For masonry below grade, in contact with earth, reinforced masonry, and where indicated, use Type S.
 - 2. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions, and for other applications where another type is not indicated, use Type N.

2.3 JOINT REINFORCEMENT, TIES, AND ANCHORS

- A. Provide joint reinforcement formed from galvanized carbon-steel wire, ASTM A 153, Class B-2, for exterior walls.
 - 1. Wire Diameter for Side Rods: 0.1875 inch.
 - 2. Wire Diameter for Cross Rods: 0.1875 inch.
 - 3. For single-wythe masonry, provide ladder design.
 - 4. For multiwythe masonry, provide ladder design with 3 side rods.

- B. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.
- C. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.060-inch-thick steel sheet, galvanized after fabrication.

2.4 EMBEDDED FLASHING MATERIALS

- A. Sheet Metal Flashing: Stainless-steel, ASTM A 240/A 240M or ASTM A 666, Type 304, 0.016 inch thick.
- B. Laminated Flashing: 5 oz./sq. ft. copper sheet bonded with asphalt between 2 layers of glass-fiber cloth.

2.5 MISCELLANEOUS MASONRY ACCESSORIES.

- A. Weep Holes: Round polyethylene tubing, 3/8-inch.
- B. Masonry Cleaner: 1/2-cup (0.14-L) tetrasodium polyphosphate and 1/2-cup (0.14-L) laundry detergent dissolved in 1 gal. (4 L) of water.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cut masonry units with motor-driven saws. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.
- C. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- D. Stopping and Resuming Work: In each course, rack back units; do not tooth.
- E. Fill cores in hollow concrete masonry units with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- F. Build non-load-bearing interior partitions full height and install compressible filler in joint between top of partition and underside of structure above.
- G. Tool exposed joints slightly concave when thumbprint hard, unless otherwise indicated.

- H. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.

3.2 FLASHING AND WEEP HOLES

- A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing before covering with mortar.
 - 1. Extend flashing 4 inches (100 mm) into masonry at each end and turn up 2 inches (50 mm) to form a pan.
- C. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.

3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified independent testing agency to perform the following tests for each 5000 sq. ft. (460 sq. m) of wall area or portion thereof.
 - 1. Mortar Properties: ASTM C 270.
 - 2. Mortar Composition and Properties: ASTM C 780.
 - 3. Grout: ASTM C 1019.

3.4 CLEANING

- A. Clean stone masonry veneer as work progresses. Remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, remove large mortar particles and scrub unit masonry.
 - 1. Wet wall surfaces with water, apply cleaner, then remove cleaner by rinsing thoroughly with clear water.

END OF SECTION 042010

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SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Abrasive metal nosings.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Metal nosings.
 - 3. Paint products.
- B. Shop Drawings: Show fabrication and installation details. Provide Shop Drawings for the following:
 - 1. Abrasive metal nosings.

1.5 INFORMATIONAL SUBMITTALS

- A. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 666, Type 316L.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.
- E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- G. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts; with hex nuts, ASTM F 594 ; and, where indicated, flat washers; Alloy Group 2 (A4).
- C. Post-Installed Anchors: Torque-controlled expansion anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594 .

2.3 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- F. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use

connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 ABRASIVE METAL NOSINGS

- A. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ACL Industries, Inc.
 - b. American Safety Tread Co., Inc.
 - c. Amstep Products.

- d. [Armstrong Products, Inc.](#)
 - e. [Balco, Inc.](#)
 - f. [Granite State Casting Co.](#)
 - g. [Wooster Products Inc.](#)
- 2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.
 - 3. Nosings: Beveled-back units, 3 inches (75 mm) wide with 1-3/8-inch (35-mm) lip, for surface mounting on existing stairs.
- B. Drill for mechanical anchors and countersink. Locate holes not more than 4 inches (100 mm) from ends and not more than 12 inches (300 mm) o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
- 1. Provide two rows of holes for units more than 5 inches (125 mm) wide, with two holes aligned at ends and intermediate holes staggered.
- C. Apply bituminous paint to concealed surfaces of cast-metal units.
- D. Apply clear lacquer to concealed surfaces of extruded units.

2.6 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.7 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.8 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

2.9 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING NOSINGS

- A. Center nosings on tread widths unless otherwise indicated.

- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079233 "Concrete Joint Sealants" to provide a watertight installation.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

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SECTION 055113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Preassembled steel stairs with concrete-filled treads.
- B. Related Requirements:
 - 1. Section 033021 "Cast-in-Place Concrete Restoration" for concrete fill for stair treads and platforms.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal pan stairs and the following:
 - 1. Abrasive nosings.
 - 2. Paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For each type and finish of nosing and tread.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Alfab, Inc.
 - 2. American Stair, Inc.
 - 3. Lapeyre Stair Inc.
 - 4. Pacific Stair Corporation.
 - 5. Worthington Metal Fabricators.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Galvanized-Steel Sheet: ASTM A 653, G90 (Z275) coating.

2.3 ABRASIVE NOSINGS

- A. Extruded Units: Aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. ACL Industries, Inc.
 - b. American Safety Tread Co., Inc.
 - c. Amstep Products.
 - d. Armstrong Products, Inc.
 - e. Balco, Inc.
 - f. Granite State Casting Co.
 - g. Wooster Products Inc.
 2. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
 3. Nosings: Square-back units, 1-7/8 inches wide, without lip.
 4. Nosings: Two-piece units, 3 inches wide, with subchannel for casting into concrete.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563 and, where indicated, flat washers.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Concrete Materials and Properties: Comply with requirements in Section 033021 "Cast-in-Place Concrete Restoration" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
- E. Welded Wire Reinforcement: ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.6 FABRICATION, GENERAL

- A. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS

- A. Metal Pan Stairs: Form risers, sub-tread pans, and sub-platforms to configurations shown from steel sheet of thickness not less than 0.067 inch.
 - 1. Steel Sheet: Galvanized-steel sheet.

2. Directly weld metal pans to stringers; locate welds on top of sub-treads where they are concealed by concrete fill. Do not weld risers to stringers.
3. Attach risers and sub-treads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
4. Shape metal pans to include nosing integral with riser.
5. Attach abrasive nosings to risers.

2.8 FINISHES

- A. Finish metal stairs after assembly.
- B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.
 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Section 033021 "Cast-in-Place Concrete Restoration."
 - 1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.

3.2 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting."
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055113

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SECTION 071800 – TRAFFIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete waterproofing system including all products specified in the following Sections:
 - 1. Division 07 Section, "Traffic Coatings"
 - 2. Division 07 Section, "Water Repellents"
 - 3. Division 07 Section, "Joint Sealants"
 - 4. Division 07 Section, "Expansion Joint Assemblies"
- B. This Section includes traffic topping: Fluid applied, waterproofing, traffic-bearing elastomeric membrane with integral wearing surface to be applied to supported floor slabs as shown on the Drawings.
- C. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
- D. Related Sections: Following Sections contain requirements that relate to this Section.
 - 1. Division 03 Section, "Cast-in-Place Concrete Restoration."
 - 2. Division 07 Section, "Water Repellents"
 - 3. Division 07 Section, "Concrete Joint Sealants"
 - 4. Division 07 Section, "Expansion Joint Assemblies"
 - 5. Division 09 Section, "Pavement Markings."

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
 - 2. Distribute reviewed submittals to all others whose Work is related.
- B. Pre-installation Conference: Meet at project site well in advance of time scheduled for Work to proceed to review requirements for Work and conditions that could interfere with successful topping performance. Require every party concerned with topping

Work, or required to coordinate with it or protect it thereafter, to attend. Include manufacturer's technical representative and warranty officer.

- C. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
 - 1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 - 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- D. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.
- E. Requests For Information
 - 1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
 - 2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
 - 3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.4 ACTION SUBMITTALS

- A. Product Data: For each system indicated at least 60 days prior to application.
 - 1. Product description, technical data, appropriate applications and limitations.
 - 2. Primer type and application rate
 - 3. Material, and wet mils required to obtain specified dry thickness for each coat.
 - 4. Type, gradation and aggregate loading required within each coat.
- B. Samples:
 - 1. One 4 in. by 4 in. stepped sample showing each component for each system indicated.
- C. Sample Warranty: For each system indicated.

1.5 INFORMATION SUBMITTALS

A. Certificates

1. Certification that products and installation comply with applicable federal, state of Massachusetts, and local EPA, OSHA and VOC requirements regarding health and safety hazards.
2. Evidence of applicator's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
3. Certification from the Manufacturer that finishes as specified are acceptable for system to be installed at least 1 month before placement of any concrete which will receive traffic topping.
4. Certification stating static coefficient of friction meets minimum requirements of Americans with Disabilities Act (ADA).
5. Certification stating materials have been tested and listed for UL 790 Class "A" rated materials/system by UL for traffic topping application specified on project. Containers shall bear UL labels.
6. Certification from manufacturer confirming compatibility with existing underlying coatings and/or substrate.

B. Manufacturer's Instructions: for each system indicated.

1. Crack treatment and surface preparation method and acceptance criteria.
2. Method of application of each coat.
3. Maximum and minimum allowable times between coats.
4. Final cure time before resumption of parking and/or paint striping.
5. Any other special instructions required to ensure proper installation.

C. Field Quality Control:

1. Quality Control Plan as defined in Part 3.
2. Two copies each of manufacturer's technical representative's log for each visit.
3. Testing agency field reports.

D. Qualification Statements

1. Manufacturer's qualifications as defined in the "Quality Assurance" article.
2. Installer's qualifications as defined in the "Quality Assurance" article.
3. Signed statement from applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Three copies of System Maintenance Manual.
- B. Five copies of snow removal guidelines for areas covered by Warranty.
- C. Final executed Warranty.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Owner retains right to reject any manufacturer.
 - 1. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
 - 2. Evidence of financial stability acceptable to Engineer/Architect.
 - 3. Listing of 20 or more projects completed with submitted system, to include:
 - a. Name and location of project.
 - b. Type of system applied.
 - c. On-Site contact with phone number.
- B. Manufacturer's technical representative, acceptable to Engineer/Architect, shall be on site during surface preparation and initial stages of installation.
- C. Installer's Qualifications: Owner retains right to reject any manufacturer.
 - 1. Evidence of compliance with Summary article paragraph "A single installer. . ."
 - 2. Evidence that installer has successfully performed or has qualified staff who have successfully performed at least 5 verifiable years of installations similar to those involved in this Contract, and minimum 10 projects with submitted system.
 - 3. Listing of 5 or more installations in climate and size similar to this Project performed by installer's superintendent.
- D. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- E. Certifications
 - 1. Traffic Topping shall satisfy the current National Volatile Organic Compound (VOC) Emission Standards for Architectural Coatings.
 - 2. Licensing/certification document from manufacturer that confirms system installer is a licensed/certified applicator for the manufacturer and is legally licensed to perform work in the state of Massachusetts.
 - 3. Licensing/certification agreement shall include following information:
 - a. Applicator's financial responsibility for warranty burden under agreement terms.
 - b. Manufacturer's financial responsibility for warranty burden under agreement terms.
 - c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
 - d. Authorized signatures for both Applicator Company and Manufacturer.
 - e. Commencement date of agreement and expiration date (if applicable).

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:

1. Name of product.
 2. Name of manufacturer.
 3. Date of preparation.
 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.
- C. Do not store material on slabs to be post-tensioned before final post-tensioning of slabs is accomplished. At no time shall weight of stored material being placed on slab area, after post-tensioning is completed and concrete has reached specified 28 day strength, exceed total design load of slab area. Between time final post-tensioning is accomplished and time concrete has reached specified 28 day strength, weight of stored material placed on slab area shall not exceed half total design load of slab area.

1.9 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.

1.10 WARRANTY

- A. System Manufacturer: Furnish Owner with written total responsibility Joint and Several Warranty, detailing responsibilities of manufacturer and applicator with regard to warranty requirements (Joint and Several). The warranty shall provide that system will be free of defects, water penetration and chemical damage related to system design, workmanship or material deficiency, consisting of:
1. Any adhesive or cohesive failures.
 2. Spalling surfaces.
 3. Weathering.
 4. Surface crazing (does not apply to traffic topping protection course).
 5. Abrasion or tear failure resulting from normal traffic use.
 6. Failure to bridge cracks less than 0.0625 in. or cracks existing at time of traffic topping installation on double tees only.
- B. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.
- C. Warranty period shall be a 5 year Joint and Several Warranty commencing with date of acceptance of work.
- D. Perform any repair under this warranty at no cost to Owner.
- E. Address the following in the terms of the Warranty: length of warranty, change in value of warranty – if any- based on length of remaining warranty period, transferability of

warranty, responsibilities of each party, notification procedures, dispute resolution procedures, and limitations of liability for direct and consequential damages.

- F. Snowplows, vandalism, studded snow tires and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of 1 of following, only where specifically named in product category:
1. Advanced Polymer Technology (APT), Harmony, PA
 2. BASF Building Systems (BASF), Shakopee, MN
 3. Neogard Division of Jones-Blair Company (Neogard), Dallas, TX.
 4. Technical Barrier Systems, Inc. (TBS), Oakville, Ontario.
 5. Tremco (Tremco), Cleveland, OH.

2.2 MATERIALS, TRAFFIC TOPPING

- A. Acceptable low odor toppings are listed below. Toppings shall be compatible with all other materials in this Section and related work.
1. Heavy Duty (Steep Ramps):
 - a. Autogard F, Neogard.
 - b. MasterSeal Traffic 2530, BASF.
 - c. Qualideck Heavy Vehicular HD-80 (152/252/372/512), APT
 - d. Kelmar TE Exposure 3, TBS.
 2. VOC Compliant, **Extreme** Low Odor, High-Solids (100%), Heavy Duty Coating (Supported Floors):
 - a. AutoGard FC, Neogard.
 - b. MasterSeal Traffic 2500, BASF.
 - c. Qualideck Heavy Vehicular HD-80 (152/252/372/512), APT
 - d. Vulkem 360NF/950NF and 951NF, Tremco.
- B. Provide ultraviolet screening for all traffic topping placed on this project.
- C. Finish top coat shall be colored grey.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning surface preparation and application:
 - 1. Concrete surfaces are finished as acceptable for system to be installed. Correct all high points, ridges, and other defects in a manner acceptable to the Engineer/Architect.
 - 2. Curing compounds used on concrete surfaces are compatible with system to be installed.
 - 3. Concrete surfaces have completed proper curing period for system selected.
 - 4. Joint Sealants are compatible with traffic toppings.

3.2 PREPARATION

- A. Seal all openings to occupied space to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- B. Acid etching is prohibited.
- C. Remove all laitance and surface contaminants, including oil, grease and dirt by shotblasting. Prepare by sandblasting all surfaces inaccessible to shotblast equipment.
- D. Before applying materials, apply system to small area to assure that it will adhere to substrate and joint sealants and dry properly and to evaluate appearance.
- E. All cracks on concrete surface shall be prepared in accordance with manufacturer's recommendations.
- F. All random cracks on concrete surface less than 0.03 in. wide and showing no evidence of water and/or salt water staining on ceiling below shall receive detail coat unless more complete treatment required in accordance with manufacturer's recommendations. Rout and seal random cracks, construction joints and control joints prior to installation of primer or base coat. Crack preparation including installation of joint sealant material, where required, is incidental to traffic topping work.
- G. Mask off adjoining surfaces not to receive traffic topping and mask off drains to prevent spillage and migration of liquid materials outside membrane area. Provide neat/straight lines at termination of traffic topping.

3.3 INSTALLATION/APPLICATION

- A. Do all Work in accordance with manufacturer's written instructions and specifications including, but not limited to, moisture content of substrate, atmospheric conditions

(including relative humidity and temperature), coverages, mil thicknesses and texture, and as shown on Drawings.

- B. A primer coat is required for all systems. No exception.
- C. Do not apply traffic topping material until concrete has been air dried at temperatures at or above 40°F. for at least 30 days after curing period specified.
- D. Cease material installation under adverse weather conditions, or when temperatures are outside manufacturer's recommended limitations for installation, or when temperature of work area or substrate are below 40°F.
- E. All adjacent vertical surfaces shall be coated with traffic topping minimum of 4 in. above coated horizontal surface. Requirement includes, but is not limited to pipes, columns, walls, curbs (full height of vertical faces of all curbs) and islands.
- F. Complete all Work under this Section before painting line stripes.
- G. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturers.

3.4 FIELD QUALITY CONTROL

- A. Develop a quality control plan for assured specified uniform membrane thickness that utilizes grid system of sufficiently small size to designate coverage area of not more than 5 gallons at specified thickness. In addition, employ wet mil gauge to continuously monitor thickness during application. Average specified wet mil thickness shall be maintained within grid during application with minimum thickness of not less than 80% of average acceptable thickness. Immediately apply more material to any area not maintaining these standards.
- B. Testing Agency employ wet mil gauge to periodically monitor thickness during application.
- C. Install 1 trial section of topping system for each duty grade specified. Do not proceed with further topping application until trial sections accepted in writing by Engineer/Architect. Remove and replace rejected trial sections with acceptable application. Trial section shall also be tested for:
 - 1. Wet mil thickness application.
 - 2. Adhesion to concrete substrate.
 - 3. Overall dry mil thickness.
- D. Use trial sections to determine adequacy of pre-application surface cleaning. Obtain Owner, Engineer/Architect and manufacturer acceptance of cleaning before proceeding with topping application.
- E. Determine overall topping system mil thickness:

1. Contractor shall provide 6 in. by 6 in. bond breaker (topping coupon) on concrete surface for each 25,000 sq ft, or fraction thereof, of topping to be placed as directed by Engineer/Architect and manufacturer. Dimensionally locate coupon for easy removal.
2. Contractor shall assist Testing Agency in removing topping coupons from concrete surface at completion of manufacturer-specified cure period. Contractor shall repair coupon area per topping manufacturer's instructions.
3. Testing Agency shall determine dry mil thickness of completed Traffic Topping System, including bond breaker. Take 9 readings (minimum), 3 by 3 pattern at 2 in. on center. No reading shall be taken closer than 1 in. from coupon edge. Report individual readings and overall topping system average to Engineer/Architect. Readings shall be made with micrometer or optical comparator.

END OF SECTION 071800

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SECTION 071900 – WATER REPELLENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete water proofing system including all products specified in the following Sections:
 - 1. Division 03 Section, "Cast-In-Place Restoration"
 - 2. Division 03 Section, "Cast-In-Place Repair Mortar"
 - 3. Division 07 Section, "Traffic Coatings"
 - 4. Division 07 Section, "Water Repellents"
 - 5. Division 07 Section, "Concrete Joint Sealants"
 - 6. Division 07 Section, "Expansion Joint Assemblies"
- B. This Section includes penetrating concrete sealer on these surfaces:
 - 1. Supported concrete floor and concrete roof surfaces including curbs, walks, islands and pour strips.
- C. Related Sections: Following Sections contain requirements that relate to this Section.
 - 1. Division 03 Section, "Cast-in-Place Concrete Restoration."
 - 2. Division 07 Section, "Traffic Coatings"
 - 3. Division 07 Section, "Concrete Joint Sealants"
 - 4. Division 07 Section, "Expansion Joint Assemblies"
 - 5. Division 09 Section, "Pavement Markings."

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D6489, "Standard Test Method for Determining the Water Absorption of Hardened Concrete Treated with a Water Repellent Coating."

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
 2. Distribute reviewed submittals to all others whose Work is related.
- B. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- C. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.
- D. Requests For Information
1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
 2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
 3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated at least 60 days prior to application.
1. Product description, technical data, appropriate applications, and limitations.
 2. Areas and application rates of materials to be applied.
 3. Proposed alternate application methods, if any.

1.6 INFORMATION SUBMITTALS

- A. Certificates
1. Certification that products and installation comply with applicable federal, state of Massachusetts, and local EPA, OSHA and VOC requirements regarding health and safety hazards.

2. Evidence of applicator's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
- B. Field Quality Control
1. ASTM D6489 Test Results
 2. Two copies of manufacturer's technical representative's log for each visit.
- C. Qualification Statements
1. Manufacturer's qualifications as defined in the "Quality Assurance" article.
 2. Installer's qualifications as defined in the "Quality Assurance" article.
 3. Signed statement from applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Owner retains right to reject any manufacturer.
1. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
 2. Evidence of financial stability acceptable to Engineer/Architect.
 3. Listing of 20 or more projects completed with submitted system, to include:
 - a. Name and location of project.
 - b. Type of system applied.
 - c. On-Site contact with phone number.
- B. Installer's Qualifications: Owner retains right to reject any installer.
1. Evidence of compliance with Summary article paragraph "A single installer. . ."
 2. Evidence that installer has successfully performed or has qualified staff who have successfully performed at least 5 verifiable years of installations similar to those involved in this Contract, and minimum 10 projects with submitted system.
 3. Listing of 5 or more installations in climate and size similar to this Project performed by installer's superintendent.
- C. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- D. Certifications
1. Sealer shall satisfy the current national and local Volatile Organic Compound (VOC) Emission Standards for Architectural Coatings.
 2. Licensing/certification document from system manufacturer that confirms system installer is a licensed/certified applicator for the manufacturer and is legally licensed to perform work in the state of Massachusetts.
 3. Licensing/certification agreement must provide following information:

- a. Applicator's financial responsibility for warranty burden under agreement terms.
- b. Manufacturer's financial responsibility for warranty burden under agreement terms.
- c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
- d. Officers' signatures for both Applicator Company and Manufacturer.
- e. Commencement date of agreement and expiration date (if applicable).

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 1. Name of product.
 2. Name of manufacturer.
 3. Date of preparation.
 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.
- C. Do not store material on slabs to be post-tensioned before final post-tensioning of slabs is accomplished. At no time shall weight of stored material being placed on slab area, after post-tensioning is completed and concrete has reached specified 28 day strength, exceed total design load of slab area. Between time final post-tensioning is accomplished and time concrete has reached specified 28 day strength, weight of stored material placed on slab area shall not exceed half total design load of slab area.

1.9 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Do not proceed with application (except with written recommendation of manufacturer) under any of the following conditions:
 1. Ambient temperature is less than 40° F.
 2. Substrate surfaces have cured for less than 1 month.
 3. Rain or temperatures below 40° F predicted for a period of 24 hours.
 4. Less than 24 hours after surfaces became wet.
 5. Substrate is frozen or surface temperature is less than 40° F.
 6. Wind velocities higher than manufacturer's specified limit to prevent solvent flash-off.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of following, only where specifically named in product category:
1. Advanced Chemical Technologies Inc. (ACT), Oklahoma City, OK.
 2. BASF Building Systems (BASF), Shakopee, MN.
 3. Evonik Degussa Corporation (Evonik Degussa), Parsippany, NJ.
 4. Lymtal International Inc. (Lymtal), Lake Orion, MI.
 5. Sika Corporation (Sika), Lyndhurst, NJ.

2.2 MATERIALS, CONCRETE SEALER

- A. Silane (90% or greater solids, 400 g/L or less VOC):
1. MasterProtect H 1000, 200 sf/g, BASF.
 2. Iso-Flex 618-100 CRS, 200 sf/g, Lymtal.
 3. Protectosil BHN, 200 sf/g, Evonik Degussa Corp.
 4. Sikagard 705L ,200 sf/g, Sika.
 5. Sil-Act ATS-100 LV, 200 sf/g, ACT.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning surface preparation and application:
1. Concrete surface finishes are acceptable for system to be installed.
 2. Curing compounds used on concrete surfaces are compatible with system to be installed.
 3. Concrete surfaces have completed proper curing period for system selected.
 4. Control joint and expansion joint Work is complete and has been accepted by Engineer/Architect.

3.2 PREPARATION

- A. Seal all openings to occupied space to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- B. Acid etching is prohibited.
- C. Repair or replace all sealant materials damaged by surface preparation operations.

- D. Shot blast clean all surfaces to be sealed as acceptable to sealer manufacturer before sealer application. Shot blasting is not recommended or required for new slabs that are water cured per ACI 308, Paragraph 2.2. Cleaning method and materials shall be sufficient to allow absorption criteria stated in Field Quality Control article to be met. Prepare by sandblasting all surfaces inaccessible to shotblast equipment.
- E. Equipment used during floor slab cleaning shall not exceed height limitation of facility and shall not exceed 3,000 lb axle load or vehicle gross weight of 6,000 lb.
- F. Mask off adjoining surfaces not to receive sealer and mask off drains to prevent spillage and migration of liquid materials outside sealer area. Provide neat/straight lines at termination of sealer.

3.3 INSTALLATION/APPLICATION

- A. Do all Work in accordance with manufacturer's written instructions and specifications including, but not limited to, moisture content of substrate, atmospheric conditions (including relative humidity and temperature), coverage, mil thickness and texture, and as shown on Drawings.
- B. Clean all surfaces affected by sealer material overspray and repair all damage caused by sealer material overspray to adjacent construction or property at no cost to Owner.
- C. Clean off excess material as work progresses using methods and materials approved by manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Install 3 trial sections of sealer to verify treated surface is not glazing as result of sealer application. If application of sealer causes glazing at trial section, contact sealer manufacturer to obtain written recommendations for solving problem. Do not proceed with sealer application following trial section applications until directed to do so in writing by Engineer/Architect.

END OF SECTION 071900

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SECTION 079233 – CONCRETE JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete water proofing system including all products specified in the following Sections:
 - 1. Division 07 Section, "Traffic Coatings"
 - 2. Division 07 Section, "Water Repellents"
 - 3. Division 07 Section, "Concrete Joint Sealants"
 - 4. Division 07 Section, "Expansion Joint Assemblies"
- B. This Section includes the following:
 - 1. Exterior joints in the following horizontal traffic bearing surfaces:
 - a. Cracks and construction joints in cast-in-place concrete.
 - b. Control joints in slab-on-grade, pour strips, slabs and topping slabs.
 - c. Joints between precast concrete units.
 - d. Perimeter of all floor drains.
- C. Related Sections: Following Sections contain requirements that relate to this Section.
 - 1. Division 01 Section "Submittal Procedures."
 - 2. Division 02 Section "Work Items."
 - 3. Division 03 Section "Cast-In-Place Concrete - Restoration."
 - 4. Division 03 Section "Unbonded Post-Tensioned Concrete."
 - 5. Division 03 Section "Cast in Place Repair Mortar."
 - 6. Division 07 Section "Expansion Joint Assemblies."
 - 7. Division 07 Section "Water Repellents."
 - 8. Division 07 Section "Traffic Coatings."
 - 9. Division 09 Section "Pavement Marking."

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Materials shall be compatible with materials or related Work with which they come into contact, and with materials covered by this Section.
 2. Distribute reviewed submittals to all others whose Work is related.
 3. Coordinate layout of joint system and approve methods for providing joints with precast concrete and concrete contractors.
 4. Inspect site and precast plant before precast production to insure proper joint configuration.
- B. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- C. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.
- D. Requests For Information
1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
 2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
 3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.4 ACTION SUBMITTALS

- A. Product Data: For each system indicated at least 60 days prior to application.
1. Product description, technical data, appropriate applications and limitations.
 2. Primer type and application rate
- B. Samples:
1. One for each system indicated.
- C. Sample Warranty: For each system indicated.

1.5 INFORMATION SUBMITTALS

A. Certificates:

1. Evidence of installer's being certified by manufacturer. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.
2. Certification from the Manufacturer that joint details as specified are acceptable for system to be installed at least 1 month before placement of any concrete which will receive joint sealant.

B. Field Quality Control:

1. Two copies each of manufacturer's technical representative's log for each visit.
2. Testing agency field and test reports.

C. Qualification Statements:

1. Manufacturer's qualifications as defined in the "Quality Assurance" article.
2. Installer's qualifications as defined in the "Quality Assurance" article.
3. Signed statement from this Section applicator certifying that applicator has read, understood, and shall comply with all requirements of this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Three copies of System Maintenance Manual.
- B. Five copies of snow removal guidelines for areas covered by Warranty.
- C. Final executed Warranty.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Owner retains right to reject any manufacturer.

1. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
2. Evidence of financial stability acceptable to Engineer/Architect.
3. Listing of 20 or more projects completed with submitted system, to include:
 - a. Name and location of project.
 - b. Type of system applied.
 - c. On-Site contact with phone number.

B. Manufacturer's technical representative, acceptable to Engineer/Architect, shall be on site during surface preparation and initial stages of installation.

C. Installer's Qualifications: Owner retains right to reject any installer or subcontractor.

1. Installer shall be legally licensed to perform work in the state of Massachusetts. Evidence of compliance with Summary article paragraph "A single installer. . ."
 2. Evidence that installer has successfully performed or has qualified staff who have successfully performed at least 5 verifiable years of installations similar to those involved in this Contract, and minimum 10 projects with submitted system.
 3. Listing of 5 or more installations in climate and size similar to this Project performed by installer's superintendent.
- D. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- E. Certifications:
1. Licensing/certification document from system manufacturer that confirms system installer is a licensed/certified applicator for the manufacturer
 2. Licensing/certification agreement shall include following information:
 - a. Applicator's financial responsibility for warranty burden under agreement terms.
 - b. Manufacturer's financial responsibility for warranty burden under agreement terms.
 - c. Process for dispute settlement between manufacturer and applicator in case of system failures where cause is not evident or cannot be assigned.
 - d. Authorized signatures for both Applicator Company and Manufacturer.
 - e. Commencement date of agreement and expiration date (if applicable).

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
1. Name of product.
 2. Name of manufacturer.
 3. Date of preparation.
 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.
- C. Do not store material on slabs to be post-tensioned before final post-tensioning of slabs is accomplished. At no time shall weight of stored material being placed on slab area, after post-tensioning is completed and concrete has reached specified 28 day strength, exceed total design load of slab area. Between time final post-tensioning is accomplished and time concrete has reached specified 28 day strength, weight of stored material placed on slab area shall not exceed half total design load of slab area.

1.9 FIELD CONDITIONS

- A. Weather and Substrate Conditions: Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.

1.10 WARRANTY

- A. System Manufacturer and Contractor shall furnish Owner written single source performance guarantee that the joint sealant system will be free of defects, water penetration and chemical damage related to system design, workmanship or material deficiency, consisting of:
 - 1. Any adhesive or cohesive failures.
 - 2. Weathering.
 - 3. Abrasion or tear failure resulting from normal traffic use.
- B. If material surface shows any of defects listed above, supply labor and material to repair all defective areas and to repaint all damaged line stripes.
- C. Warranty period shall be a 5 year period commencing with date of acceptance of work.
- D. Perform any repair under this warranty at no cost to Owner.
- E. Address the following in the terms of the Warranty: length of warranty, change in value of warranty – if any- based on length of remaining warranty period, transferability of warranty, responsibilities of each party, notification procedures, dispute resolution procedures, and limitations of liability for direct and consequential damages.
- F. Snowplows, vandalism, and abnormally abrasive maintenance equipment are not normal traffic use and are exempted from warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of 1 of following, only where specifically named in product category:
 - 1. BASF Building Systems (BASF), Shakopee, MN.
 - 2. Dow Corning Corp. (Dow Corning), Midland, MI.
 - 3. Lyntal International Inc. (Lyntal), Lake Orion, MI.
 - 4. Pecora Corporation (Pecora), Harleysville, PA.
 - 5. Sika Corporation (Sika), North Canton, OH.
 - 6. Tremco (Tremco), Cleveland, OH.

2.2 MATERIALS, JOINT SEALANT SYSTEM

- A. Provide complete system of compatible materials designed by manufacturer to produce waterproof, traffic-bearing control joints as detailed on Drawings.
- B. Compounds used for sealants shall not stain masonry or concrete. Aluminum pigmented compounds not acceptable.
- C. Color of sealants shall match adjacent surfaces.
- D. Closed cell or reticulated backer rods: Acceptable products:
 - 1. "Sof Rod," Nomaco Inc., 501 NMC Drive, Zebulon, NC 27597. (800) 345-7279 ext. 341.
 - 2. "ITP Soft Type Backer Rod," Industrial Thermo Polymers Limited, 2316 Delaware Ave., Suite 216, Buffalo, NY 14216. (800) 387-3847.
 - 3. "MasterSeal 921 Backer Rod," BASF.
- E. Bond breakers and fillers: as recommended by system manufacturer.
- F. Primers: as recommended by sealant manufacturer.
- G. Acceptable sealants are listed below. Sealants shall be compatible with all other materials in this Section and related work.
- H. Acceptable polyurethane crack and joint sealants (traffic bearing):
 - 1. Sikaflex-2c NS, Sika.
 - 2. MasterSeal NP-2, BASF.
 - 3. Dymeric 240/240FC, Dymonic 100, Tremco.
 - 4. Dynatred, Pecora.
 - 5. Iso-flex 881, Lyntal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive Work and report immediately in writing to Engineer/Architect any deficiencies in surface which render it unsuitable for proper execution of Work.
- B. Coordinate and verify that related Work meets following requirements before beginning installation
 - 1. Concrete surfaces are finished as acceptable for system to be installed.
 - 2. Curing compounds used on concrete surfaces are compatible with system to be installed.
 - 3. Concrete surfaces have completed proper curing period for system selected.

3.2 PREPARATION

- A. Seal all openings to occupied space to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- B. Correct unsatisfactory conditions before installing sealant system.
- C. Acid etching is prohibited.
- D. Grind joint edges smooth and straight with beveled grinding wheel before sealing. All surfaces to receive sealant shall be dry and thoroughly cleaned of all loose particles, laitance, dirt, dust, oil, grease or other foreign matter. Obtain written approval of method from system manufacturer before beginning cleaning.
- E. Final preparation of joints shall be a sandblast with medium that removes dust and ground material from surfaces to receive sealant.
- F. Check preparation of substrate for adhesion of sealant.
- G. Prime and seal joints and protect as required until sealant is fully cured. A primer coat is required for all systems.

3.3 INSTALLATION/APPLICATION

- A. Do all Work in strict accordance with manufacturer's written instructions and specifications including, but not limited to, moisture content of substrate, atmospheric conditions (including relative humidity and temperature), thicknesses and texture, and as shown on Drawings.
- B. Completely fill joint without sagging or smearing onto adjacent surfaces.
- C. Fill horizontal joints slightly recessed to avoid direct contact with wheel traffic.
- D. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturers.
- E. Cease material installation under adverse weather conditions, or when temperatures are outside manufacturer's recommended limitations for installation, or when temperature of work area or substrate are below 40°F.

3.4 FIELD QUALITY CONTROL

- A. Contractor and Engineer/Architect will jointly determine which one of following 2 methods of sealant testing to verify sealant profile:
 - 1. Contractor, at Engineer/Architect's direction, shall cut out lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random

- locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
2. Contractor, at Engineer/Architect's direction, shall install 3 trial joint sections of 20 ft each. Contractor shall cut out joint sections, as selected by Engineer/Architect, for Engineer/Architect and Manufacturer's Representative inspection. Additional isolated/random removals may be required where sealant appears deficient. Total cut out sealant shall not exceed lesser of 1% of total lineal footage placed or total of 100 lineal ft of joint sealant at isolated/random locations (varying from in. to ft of material) for Engineer/Architect and Manufacturer's Representative inspection of sealant profile.
- B. Repair all random joint sealant "cut out" sections at no cost to Owner.
- C. Flood test joints where shown on Drawings.
- D. Testing Agency:
1. Check shore hardness per ASTM standard specified in sealant manufacturer's printed data.
 2. If flood test of joints required by this Section, report results to Engineer/Architect.

END OF SECTION 079233

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SECTION 079236 – ARCHITECTURAL JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Non-staining silicone joint sealants.
- B. Related Requirements:
 - 1. Section 079500 "Expansion Joint Assemblies" for preformed compressible foam and precured joint seals.
 - 2. Section 079233 "Concrete Joint Sealants" for sealing joints in horizontal traffic-bearing areas and vertical joints in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.

- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- D. Field-Adhesion-Test Reports: For each sealant application tested.
- E. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each kind of sealant and joint substrate.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint

substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.

6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: **Five (5)** years from date of Substantial Completion.
- B. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 50, NT: Single-component, non-sag, plus 50 percent and minus 50 percent movement capability, non-traffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Pecora Corporation.
 - d. Sika Corporation.

2.3 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. BASF Corporation-Construction Systems.
 - b. Construction Foam Products; a division of Nomaco, Inc.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances

capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

- C. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written

instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform **10** tests for the first **1000 feet (300 m)** of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each **1000 feet (300 m)** of joint length thereafter or one test per each floor per elevation.
2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal non-traffic surfaces.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in glass unit masonry assemblies.
 - e. Joints between metal panels.
 - f. Joints between different materials listed above.
 - g. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - h. Control and expansion joints in ceilings and other overhead surfaces.
 - i. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, Non-staining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079236

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SECTION 079500 – EXPANSION JOINT ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. A single installer shall be responsible for providing complete water proofing system including all products specified in the following Sections:
 - 1. Division 07 Section, "Traffic Coatings"
 - 2. Division 07 Section, "Water Repellents"
 - 3. Division 07 Section, "Concrete Joint Sealants"
 - 4. Division 07 Section, "Architectural Joint Sealants"
 - 5. Division 07 Section, "Expansion Joint Assemblies"
- B. This Section includes the following:
 - 1. Standard expansion joint systems:
 - a. Elastomeric concrete edged, extruded rubber joint system
 - 2. Vertical expansion joint systems
- C. Related Sections: The following Sections contain requirements that relate to this section:
 - 1. Division 03 Section "Cast-in-Place Concrete Restoration."
 - 2. Division 03 Section "Cast-in-Place Repair Mortar."
 - 3. Division 04 Section "Unbonded Post-Tensioned Concrete."
 - 4. Division 07 Section "Concrete Joint Sealants."
 - 5. Division 09 Section "Pavement Markings".

1.3 DEFINITIONS

- A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.

- C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage (plus or minus) of nominal value of joint width. Movement capability is to include anticipated movements from concrete shrinkage, concrete shortening and creep from post-tensioning or prestressing, cyclic thermal movements, and seismic movements.
- D. Nominal Joint Width: Width of linear opening specified in practice and in which joint system is installed.
- E. Nominal Form Width: Linear gap in joint system at time of forming or erection of structural elements bounding the expansion joint.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. General:
 - a. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.
 - b. Coordinate requirements for transitions, tolerances, levelness, and plumbness to ensure the installed expansion joint system can perform with expected movement capabilities.
 - c. Coordinate and assign responsibility for preparation of concrete surfaces adjacent to expansion joints.
 - d. Expansion joint surface areas each side of joint gap shall have a vertical differential less than $\frac{1}{4}$ " and meet requirements of expansion joint manufacturer.
 - e. Minor surface defects shall be repaired according to manufacturer's recommendations. Repair materials shall be compatible with intended system materials and shall be approved by the Engineer prior to surface preparation and installation.
 - f. Submit for approval repair products and procedures for all major defects. Repair description shall indicate materials, manufacturer's requirements, expected service life, and maintenance requirements. Take all precautions necessary to avoid damaging adjacent surfaces and embedded reinforcement or post tensioned anchors and tendons. Contractor is responsible for any damages. Concrete repairs shall be of rectangular configuration, with no feather-edged surfaces. Final surface preparation of all repairs shall be sandblasting, or approved equivalent.
 - g. Coordinate layout of joint system and approval of methods for providing joints.
 - 2. Joint Opening Width:

- a. Use temperature adjustment table to properly size joint gap at time of concrete pour and show that proposed joint system is capable of equal individual and combined movements in each direction when installed at designated temperature shown on drawings.
 - b. Where installation temperature is other than specified temperature, perform calculations showing joint is capable of movement within design temperature range (Criteria on Drawings) for "other" temperature, and that design and installation follow manufacturer's recommendations.
 - c. Expansion joint movement capability and the actual joint gap movement may not coincide. Construct actual joint gap in accordance with expansion design criteria.
3. Blockouts:
 - a. Float expansion joint blockouts to remove all air pockets, voids and spalls caused by form work.
 - b. Blockouts shall be plumb with maximum tolerance per Manufacturer or not more than 0.125 inches deviation in 12 inches. Noncompliant blockouts shall be considered major defects.
 - c. Blockouts shall be straight and true with maximum tolerance per Manufacturer or not more than 0.250 inches deviation in 10 lineal feet. Noncompliant blockouts shall be considered major defects.
- B. Preinstallation Meetings: Meet at project site well in advance of time scheduled for Work to proceed to review requirements for Work and conditions that could interfere with successful expansion joint system performance. Require every party concerned with concrete formwork, blockout, concrete placement, or others required to coordinate or protect the Work thereafter, to attend. Include Engineer of Record and manufacturer's technical representative and warranty officer.
- C. Make submittals in accordance with requirements of Division 01 Section, "Submittal Procedures:"
 1. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
 2. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- D. Submittals and Resubmittals: Engineer will review each of Contractor's shop drawings and/or submittal data the initial time and, should resubmittal be required, one additional time to verify that reasons for resubmittal have been addressed by Contractor and corrections made. Resubmittal changes/revisions/corrections shall be circled. Engineer will review only circled items and will not be responsible for non-circled changes/revisions/corrections and additions. Should additional resubmittals be required, Contractor shall reimburse Owner for all costs incurred, including the cost of Engineer's services made necessary to review such additional resubmittals. Owner shall in turn reimburse Engineer.
- E. Requests For Information

1. Engineer reserves the right to reject, unprocessed, any Request for Information (RFI) that the Engineer, at its sole discretion, deems frivolous.
2. Engineer reserves the right to reject, unprocessed, any RFI that the Engineer, at its sole discretion, deems already answered in the Contract Documents.
3. RFI process shall not be used for requesting substitutions. Procedures for substitutions are clearly specified elsewhere in the contract documents.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated:

1. Construction details, material descriptions, dimensions, and finishes.
2. Proposed method of preparation of concrete surface to receive expansion joint systems.
3. Proposed method and details for treatment of cracks, bugholes, or other potential concrete surface defects in areas to receive expansion joint systems.
4. Horizontal spacing between embedded metals and plates to allow for volume change due to thermal conditions.
5. Temperature adjustment table showing formed gap at the time of concrete placement calculated at 10°F increments and a calculation showing joint system is capable of movement within the design temperature range.

B. Shop Drawings: For each type of product indicated:

1. Placement Drawings: Show project conditions including, but not limited to, line diagrams showing plans, elevations, sections, details, splices, blackout requirement, and terminations. Provide isometric or clearly detailed drawings depicting how components interconnect. Include reviewed and approved details from others whose work is related. Other information required to define joint placement or installation.
2. Joint System Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - a. Manufacturer and model number for each joint system.
 - b. Joint system location cross-referenced to Drawings.
 - c. Form width.
 - d. Nominal joint width.
 - e. Movement capability.
 - f. Minimum and maximum joint width.
 - g. Classification as thermal or seismic.
 - h. Materials, colors, and finishes.
 - i. Product options.
 - j. Fire-resistance ratings.
3. Components and systems required to be designed by a professional engineer, shall bear such professional's written approval when submitted.

C. Samples:

1. Samples for each type of joint system indicated.

- a. Submit **2** samples for each type. Full width by 6 inches long, for each system required.
 2. Develop mockups of concrete surface preparation for review and to establish a control for the application.
- D. Delegated Design Submittals:
1. Analysis indicating expansion joint system complies with expansion joint performance and design criteria of this specification and is suitable for use in conditions of this project. Provide a summary of design criteria used in design.
- E. Test and Evaluation Reports:
1. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for current products.

1.6 INFORMATIONAL SUBMITTALS

- A. Certificates
1. Certification that products and installation comply with applicable federal, state of Massachusetts, and local EPA, OSHA and VOC requirements regarding health and safety hazards.
 2. ADA Certification: Prior to installation, submit written certification from manufacturer indicating that expansion joints conform to Americans with Disabilities Accessibility Guidelines for Buildings and Facilities, as published by U.S. Architectural & Transportation Barriers Compliance Board, 1331 F Street, N.W., Suite 1000, Washington, DC 20004-1111. 1-800-872-2253.
 - a. Submit test reports from accredited laboratory attesting to joint systems' movement capability and ADA compliance.
 - b. Static coefficient of friction shall meet minimum requirements of Americans with Disabilities Act (ADA).
 3. Signed statement from installer/applicator certifying that installer/applicator has read, understood, and shall comply with all requirements of this Section.
 4. Signed statement from manufacturer's representative that they have read, understood, and shall comply with all requirements of this section.
- B. Field Quality Control
1. Two copies each of manufacturer's technical representative's log for each visit.
- C. Qualification Statements

1. Manufacturer's qualifications as defined in the "Quality Assurance" article within 60 days of project award.
2. Installer's qualifications as defined in the "Quality Assurance" article.
3. Evidence of manufacturer's certification of installer/applicator. Evidence shall include complete copy of manufacturer's licensing/certification document, spelling out repair responsibility for warranty claims.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Contracts: 2 copies of Maintenance Program contracts.
- B. Operation and Maintenance Data
 1. Maintenance Manual: 3 copies of System Maintenance Manual.
 2. Five copies of snow removal guidelines for areas covered by warranty.
- C. Warranty Documentation: 2 executed copies of Labor and Material Warranty including all terms, conditions and maintenance requirements.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Owner retains right to reject any manufacturer.
 1. Evidence of compliance with Experience Record and Qualifications paragraph below.
 2. Evidence of acceptable previous work on WALKER-designed projects. If none, so state.
 3. Copy of sample warranty that meets the requirements of the "Warranty" article in Section 1.
 4. Evidence of financial stability acceptable to Owner or Engineer/Architect.
 5. Evidence of compliance with "Single Installer" requirement.
- B. Experience Record and Qualifications:
 1. Acceptable field history consists of successful performance of five (5) installations in place over the previous five (5) years under similar project loads, traffic frequency, footprints, and joint sizes. Include sketches, photos, and references for each installation. Installations shall have experienced at least moderate levels of traffic.
- C. Installer Qualifications: An employer of workers, including superintendent for this project, trained and approved by manufacturer.
- D. Testing Agency: Independent testing laboratory employed by Owner and acceptable to Engineer/Architect.
- E. Certifications

1. Provide reports to Owner detailing maintenance activities have been performed in accordance with written maintenance agreement for expansion joints.
2. Materials shall be compatible with materials or related Work with which they come into contact and the related materials sections.
3. Manufacturer/Applicator: Review and approve all details before construction. Confirm in writing to Owner.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials to site in original, unopened containers, bearing following information:
 1. Name of product.
 2. Name of manufacturer.
 3. Date of preparation.
 4. Lot or batch number.
- B. Store materials under cover and protect from weather. Replace packages or materials showing any signs of damage with new material at no additional cost to Owner.

1.10 WARRANTY

- A. Warranty period shall be a **5** year labor and materials warranty commencing with date of acceptance of work.
- B. Installation Requirements: Include a written plan of construction and coordination requirements, to allow joint system installation to proceed with specified warranty, that specifically addresses the following:
 1. Block out acceptance criteria.
 2. Surface preparation acceptance criteria.
 3. Crack, surface defect, and detailing recommendations.
 4. Method of protection of surrounding surfaces.
 5. Method of expansion joint system installation description.
 6. Primer type and application rate.
 7. Method of preparation of all glands and reinforced membranes.
 8. Temperature, humidity and other weather constraints. Specify substrate moisture testing criteria, if any.
 9. Final cure time before removal of protection, resumption of traffic, and/or paint striping.
 10. Any other special instructions required to ensure proper installation.
- C. Quality Service Requirements: Show evidence of licensed/approved installer. List of names, addresses and phone numbers, with copies of certification/approval agreement with each, satisfies requirement. Licensing/certification agreement shall include following information:
 1. Installer's financial responsibility for warranty burden under agreement terms.

2. Manufacturer's financial responsibility for warranty burden under agreement terms.
 3. Process for dispute settlement between manufacturer and installer in case of system failures where cause is not evident or cannot be assigned.
 4. Authorized signatures for both Installer Company and Manufacturer.
 5. Commencement date of agreement and expiration date (if applicable).
 6. Provide copy of contractor's field application quality control procedures.
- D. Warranty shall be jointly executed by Manufacturer and Installer for labor and materials. Detail responsibilities of General Contractor, manufacturer and installer with regard to warranty requirements, as outlined in the Manufacturer's warranty and related Licensing/Certification documents. Warranty shall provide that system shall be free of defects, water penetration and chemical damage related to system design, workmanship or material deficiency, consisting of:
1. Any water leakage through expansion joint system or leaking conditions of reinforced membrane, other waterproofing components, or glands.
 2. Any adhesive or cohesive failures of the system.
 3. Shifting of plates out of alignment due to system failure.
 4. Loose plates, anchor blocks, bolts.
 5. Metal to metal vibration causing noises during use.
 6. Metal to non-metal vibration causing noises during use.
 7. Tears, weathering, or degradation in gland from normal use.
 8. Expansion joint glands are considered defective if they buckle upwards beyond the level of the floor surface after installation or downward in excess of ½ inch below the floor surface.
- E. If expansion joint systems or components show any of defects listed above, supply labor and material to repair all defects at no cost to Owner.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. A single Installer shall be responsible for providing complete expansion joint system. Obtain all joint systems through one source from a single manufacturer.
- B. Drawings indicate size, profiles, and dimensional requirements of joint systems and are schematic for systems indicated.
- C. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.2 PERFORMANCE REQUIREMENTS

- A. Intent of this section is to insure that installed expansion joints allow pedestrian and vehicular traffic to pass in a smooth, quiet fashion with minimal maintenance required over a period of not less than 10 years. Expansion joints shall not only function as structural bridging elements, but must also accommodate structural expansions/contractions and minimize water leakage.
- B. Provide design of expansion joint for preparation of final details for fabrication and construction of all concrete openings, expansion joint elements and required accessories.
- C. Expansion joint design shall meet or exceed all expected movements.
- D. Installation temperature range and estimated volume change movements are shown on drawings. Nominal form width shown on the drawings shall be adjusted for the ambient temperature at time of concrete placement and designer shall verify that width of joint at installation shall meet minimum installation requirements.
- E. Expansion joint systems shall be capable of resisting a differential vertical movement of $\frac{1}{2}$ inch.
- F. Materials shall be supplied in lengths to minimize or eliminate the need to splice waterproofing components.
 - 1. Waterproofing materials directly exposed to vehicular traffic shall be supplied with no joints in vehicle drive aisles.
 - 2. All mitered splices shall be performed at the factory and provide sufficient gland length for butt splicing with field splicing equipment.
 - 3. All Santoprene butt to butt splices shall be heat welded.
 - 4. Butt to butt splices with other materials shall be per manufacturer's recommendations.
- G. Design system for passenger vehicles traveling at speeds normally expected within a parking structure.
- H. Fire-Test-Response Characteristics: Where indicated, provide expansion joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- I. Walking Surfaces: Expansion joint assemblies at walking areas subject to pedestrian traffic shall provide a smooth, slip resistant walking surface for pedestrians with these minimum requirements:
 - 1. Shall provide walking surfaces in accordance with ASTM – F 1637 Standard Practice for Safe Walking Surfaces.
 - 2. Shall be designed to comply with "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)." Americans with Disabilities Accessibility Guidelines for Buildings and Facilities, as published by U.S. Architectural & Transportation Barriers Compliance Board, 1331 F Street, N.W., Suite 1000, Washington, DC 20004-1111. 1-800-872-2253.

3. Adjoining walkway surfaces shall be flush and meet the following minimum requirements:
 - a. Changes in level of less than $\frac{1}{4}$ inch in height may be without edge treatment as shown in ADA Figure 303.2 and on the Drawings.
 - b. Changes in Level between $\frac{1}{4}$ inch and $\frac{1}{2}$ inch in height shall be beveled with a slope no greater than 1:2 as shown in ADA Figure 303.3 and on the Drawings.
 - c. Changes in level greater than $\frac{1}{2}$ inch in height are not permitted unless they can be transitioned by means of a ramp as shown on Drawings.
 - d. Openings in floor or ground surfaces shall not allow passage of a sphere more than $\frac{1}{2}$ inch diameter except as allowed for elevators and platform lifts as shown in ADA Figure 302.3 and on the Drawings.

2.3 MANUFACTURERS

- A. Subject to compliance with requirements, provide products from one of following manufacturers (listed in alphabetical order), only where specifically named in product categories:
 1. Construction Specialties, Inc., Muncy, PA (C/S).
 2. Emseal Joint Systems, Westborough, MA (Emseal).
 3. Erie Metal Specialties, Inc., Akron, NY (EMS).
 4. Tremco, Cleveland, OH (Tremco).
 5. Watson Bowman Acme Corporation, a Division of BASF Construction Chemicals NA, Amherst, NY (WBA).

2.4 PRODUCTS, STANDARD EXPANSION JOINT SYSTEMS

- A. Elastomeric concrete edged, extruded rubber expansion joint system.
 1. Polycrete/Membrane System, Type CR Series, EMS.
 2. Thermaflex Membrane/Nosing System, Type TM and TCR Series, Emseal.
 3. Vulkem WF series Vehicular Expansion Joint System, Tremco.
 4. Wabo®Crete Membrane System ME Series, WBA.
 5. ZB 200/400 Series, C/S.
- B. Extruded Neoprene closed cell rubber expansion joint for vertical applications, stair towers, columns, perimeter floor-to-wall joints.
 1. DuraFlex™ Flex Seal FS Series, Balco.
 2. Expanded Rubber Sealing System, ERS Series, MM.
 3. Iso-Flex Foamflux Joint Seal, LymTal.
 4. Wabo®InverSeal, WBA.
- C. Substitutions: Products meeting the Experience Record and Qualifications section will be considered.

2.5 PRODUCTS, OTHER

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and blockouts where expansion joint systems will be installed for installation tolerances and other conditions affecting performance of Work.
- B. Check elevations on each side of expansion joint gap to ensure flush slab-to-slab transition.
- C. Check anticipated or actual minimum and maximum joint openings. Compare to manufacturer's movement specifications and make joint sizing recommendations.
- D. Coordinate and verify that related Work meets following requirements:
 - 1. Check adhesion to substrates and recommend appropriate preparatory measures.
 - 2. Curing compounds used on concrete surfaces are compatible with Work to be installed.
 - 3. Concrete surfaces have completed proper curing period for system selected.
 - 4. Coordinate expansion joint system with other related Work before installation of expansion joint.
 - 5. Verify expansion joints are compatible with Joint Sealants and traffic toppings.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.
- F. Cease installation if expansion joint blockouts and/or openings exhibit cracked edges, voids or spalls. Repair with approved material prior to installation of expansion joint.
- G. Correct unsatisfactory conditions in manner acceptable to Manufacturer and Engineer before installing joint system.

3.2 PREPARATION

- A. Prepare for installation of expansion joint systems in accordance with manufacturer's recommendations
- B. Surface Preparation:
 - 1. Acid etching: Prohibited.
 - 2. Prepare substrates according to joint system manufacturer's written instructions.
 - 3. Clean joints thoroughly in accordance with manufacturer's instructions to remove all laitance, unsound concrete and curing compounds which may interfere with adhesion.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing joint assemblies and materials unless more stringent requirements are indicated.
- B. Proceed with work only when existing and forecast weather and temperature of concrete substrate will permit work in accordance with manufacturer's recommendations.
- C. Cease material installation under adverse weather conditions, or when temperatures are outside manufacturers recommended limitations for installation, or when temperature of work area or substrate are below 40°F.
- D. During months when historic mean daily temperature at Project is more than 19° F. colder than annual mean daily temperature, premolded sealant shall be installed on temporary basis to prevent hot weather buckling. Provide permanent installation during acceptable weather conditions.
- E. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
- F. Seal all openings to occupied spaces to prevent cleaning materials, solvents and fumes from infiltration. All protective measures and/or ventilating systems required to prevent infiltration are incidental to this Work.
- G. Clean off excess material and material smears adjacent to joints as work progresses using methods and materials approved by manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Field Tests and Inspections: Prior to opening to traffic, test joint seal for leaks by maintaining continuously wet for 12 hours. Repair leaks revealed by examination of seal underside. Repeat test and repairs until all leaks stopped for full 12 hours.
- B. Manufacturer Services: Provide qualified manufacturer's technical representative for periodic inspection of Work at critical time of the installation, including but not limited to pre-concrete formwork and placement site meetings, block out inspection, surface defect repair, surface preparation, metal work, expansion gland installation and waterproofing system installation.

3.5 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install

temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of Work.

END OF SECTION 079500

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SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Steel doors and frames.
- B. Related Sections include the following:
 - 1. Division 08 Section "Door Hardware" for door hardware and weather stripping.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.
- C. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.5 QUALITY ASSURANCE

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Engineer/Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch-high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amweld International, LLC.
 - 2. Apex Industries, Inc.
 - 3. Ceco Door Products; an Assa Abloy Group company.
 - 4. Commercial Door & Hardware Inc.
 - 5. Concept Frames, Inc.
 - 6. Curries Company; an Assa Abloy Group company.
 - 7. Custom Metal Products.
 - 8. Daybar.
 - 9. Deansteel.
 - 10. DKS Steel Door & Frame Sys. Inc.
 - 11. Door Components, Inc.
 - 12. Fleming-Baron Door Products.
 - 13. Gensteel Doors Inc.
 - 14. Greensteel Industries, Ltd.
 - 15. HMF Express.
 - 16. Hollow Metal Inc.
 - 17. Hollow Metal Xpress.
 - 18. J/R Metal Frames Manufacturing, Inc.
 - 19. Karpen Steel Custom Doors & Frames.
 - 20. L.I.F. Industries, Inc.
 - 21. LaForce, Inc.
 - 22. Megamet Industries, Inc.
 - 23. Mesker Door Inc.
 - 24. Michbi Doors Inc.
 - 25. MPI Group, LLC (The).
 - 26. National Custom Hollow Metal.
 - 27. North American Door Corp.
 - 28. Philipp Manufacturing Co (The).

29. Pioneer Industries, Inc.
30. Premier Products, Inc.
31. Republic Doors and Frames.
32. Rocky Mountain Metals, Inc.
33. Security Metal Products Corp.
34. Shanahans Manufacturing Ltd.
35. Steelcraft; an Ingersoll-Rand company.
36. Steward Steel; Door Division.
37. Stiles Custom Metal, Inc.
38. Titan Metal Products, Inc.
39. Trillium Steel Doors Limited.
40. West Central Mfg. Inc.
41. Or Engineer approved equal

2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- C. Fire-Rated, Borrowed-Light Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 HOLLOW-METAL DOORS AND FRAMES

- A. Construct doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3.
 1. Physical Performance: Level A according to SDI A250.4.
 2. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches (44.5 mm.)
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
 - d. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
 3. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.

2.4 FRAME ANCHORS

- A. Jamb Anchors:
 1. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
 1. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- B. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

2.6 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
 1. Vertical Edges for Single-Acting Doors: Provide beveled or square edges at manufacturer's discretion.
 2. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
 3. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
 4. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- C. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:
 - 1) Four anchors per jamb.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with hairline joints.

2.7 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 2. Finish Coat: Paint for new doors and frames shall be as specified in Section "Exterior Painting." Color to be specified by Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - b. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - c. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
 2. At Bottom of Door: 3/4 inch (19.1 mm) plus or minus 1/32 inch (0.8 mm).
 3. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 081113

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes items known commercially as finish or door hardware that are required for swing, except special types of unique hardware specified in the same Sections as doors and door frames on which they are installed.
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 08 Section "Hollow Metal Doors and Frames" hollow metal doors and frames.
 - 2. Division 09 Section "Exterior Painting".

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 01 Specification Sections.
- B. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
 - a. Type, style, function, size, and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.

- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications: Recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Engineer/Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - 1. Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.
- C. Regulatory Requirements: Comply with provisions of the following:
 - 1. All hardware shall comply with accessibility requirements. Use the most restrictive standards of the following codes. Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG," or Local Accessibility Standards as required by the Governing Body.
 - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist. Must operate with a closed fist.
 - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - 1) Interior Hinged Doors: 5 lbf applied perpendicular to door..
 - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - c. Thresholds: Not more than ½ inch high. Bevel raised thresholds with a slope of not more than 1:2.
 - 2. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Door Closers: Not more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.
 - c. Thresholds: Not more than ½ inch high.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested

by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.

1.5 PRODUCT HANDLING

- A. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: **Three (3)** years from date of Substantial Completion, unless otherwise indicated.

1.7 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 HINGES

- A. Hinges: BHMA A156.1
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Baldwin Hardware Corporation.
 - b. Bommer Industries, Inc.
 - c. Cal-Royal Products, Inc.
 - d. Hager Companies.
 - e. IVES Hardware; an Ingersoll-Rand company.
 - f. Lawrence Hardware Inc.
 - g. McKinney Products Company; an ASSA ABLOY Group company.
 - h. PBB, Inc.
 - i. Stanley Commercial Hardware; Div. of The Stanley Works.

2.2 MECHANICAL LOCKS AND LATCHES

- A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

2.3 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Von Duprin; an Ingersoll-Rand company.
 - b. Engineer Approved Equal

2.4 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. LCN Closers; an Ingersoll-Rand company.
 - b. Engineer Approved Equal

2.5 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16; aluminum base metal.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Glynn Johnson
 - b. Engineer Approved Equal

2.6 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. M-D Building Products, Inc.
 - c. National Guard Products.
 - d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - e. Reese Enterprises, Inc.
 - f. Sealeze; a unit of Jason Incorporated.
 - g. Zero International

2.7 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. M-D Building Products, Inc.
 - c. National Guard Products.
 - d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - e. Reese Enterprises, Inc.
 - f. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - g. Sealeze; a unit of Jason Incorporated.
 - h. Zero International.

2.8 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Baldwin Hardware Corporation.
 - b. Cal-Royal Products, Inc.
 - c. Don-Jo Mfg., Inc.
 - d. Hager Companies.
 - e. Rockwood Manufacturing Company.
 - f. Stanley Commercial Hardware; Div. of The Stanley Works.
 - g. Trimco.

2.9 DOOR SHOES

- A. Door Shoe: ANSI/BHMA 156.18; Minimum 3-1/2" high; Extruded tempered aluminum 6063-T6; with resilient or flexible vinyl seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.

2.10 MATERIALS AND FABRICATION

- A. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.
- B. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- C. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.

2.11 HARDWARE FINISHES

- A. Provide stainless steel door hinges and push-pull latch/lever.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Engineer/Architect.
 1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

- D. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
- B. Clean adjacent surfaces soiled by hardware installation.

END OF SECTION 087100

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SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMUs).
 - 3. Steel and iron.
 - 4. Galvanized metal.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
 - 2. Section 055213 "Pipe and Tube Railings" for shop priming pipe and tube railings.

1.3 DEFINITIONS

- A. MPI Gloss Level 1 (Matte Finish): Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 3 ('Egg-Shell-Like' Finish): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 4 ('Satin-Like' Finish): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. MPI Gloss Level 6 (Gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same product run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: Not less than 5 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Behr Process Corporation.
 2. Benjamin Moore & Co.
 3. California Paints.
 4. Conco Paints.
 5. Coronado Paint; Benjamin Moore Company.
 6. Diamond Vogel Paints.
 7. Dulux (formerly ICI Paints); a brand of AkzoNobel.
 8. Dunn-Edwards Corporation.
 9. Duron, Inc.
 10. Frazee Paint; Comex Group.
 11. Glidden Professional.
 12. Kelly-Moore Paint Company Inc.
 13. Kwal Paint; Comex Group.
 14. M.A.B. Paints.
 15. Parker Paint; Comex Group.
 16. PPG Architectural Finishes, Inc.

17. Pratt & Lambert.
18. Rodda Paint Co.
19. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
20. Sherwin-Williams Company (The).
21. Zinsser; Rust-Oleum Corporation.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. VOC Content: For field applications, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 50 g/L.
 3. Dry-Fog Coatings: 150 g/L.
 4. Primers, Sealers, and Undercoaters: 100 g/L.
 5. Rust-Preventive Coatings: 100 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
- D. Colors: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Masonry (Clay and CMUs): 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Non-traffic Surfaces:
 - 1. Latex System, MPI EXT 3.1A:
 - a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
 - b. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10.
- B. CMU Substrates:
 - 1. Latex System, MPI EXT 4.2A:
 - a. Prime Coat: Block filler, latex, interior/exterior, MPI #4.
 - b. Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.
- C. Steel and Iron Substrates:
 - 1. Alkyd System, MPI EXT 5.1D:
 - a. Prime Coat: Primer, alkyd, anticorrosive, for metal, MPI #79.
 - b. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6), MPI #9.
- D. Galvanized-Metal Substrates:
 - 1. Alkyd System, MPI EXT 5.3B:
 - a. Prime Coat: Primer, galvanized, cementitious, MPI #26.
 - b. Topcoat: Alkyd, exterior, gloss (MPI Gloss Level 6), MPI #9.

END OF SECTION 099113

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SECTION 099120 - PAVEMENT MARKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. This Section includes surface preparation and application of paint systems for the high build, two coat systems for the items of types, patterns, sizes, and colors described in this article.
- B. Provide the following systems as shown on Drawings:
 - 1. Parking Stall Stripes.
 - 2. Traffic Arrows, crosswalks, accessible stall access aisles, walkways, symbols, stop bars, words and other markings.
 - 3. International Symbol of Accessibility.
- C. Provide painting of curbs and curb ramps as described in the following paragraphs:
 - 1. Paint vertical surface and the first 6 in. of the abutting horizontal surface at the top of all curbs and islands (including PARCS equipment islands) within parking facility except those which do not exceed 3'0" in width and abut a wall, spandrel panel, bumper wall guardrail or other construction (not including landscaping or equipment) which prevents passage of pedestrians.
 - 2. In parking areas and/or at streets and sidewalks within the project limits or constructed as part of this project, paint curb ramps (including flares), curb returns at curb ramps and any projecting elements at edges of accessible ramps without handrails. Paint curb returns at driveways and paint curb minimum of 3 ft either side of curb ramp or driveway, (or curb ramp flare length, whichever is greater) in accordance with Pavement Marking.
 - 3. Paint color for curbs and curb ramps shall be yellow.
- D. Proportion International Symbol of Accessibility in accordance with ICC A117.1-2009 Accessible and Usable Buildings or 2010 ADA Standards for Accessible Design.
- E. Related Work:
 - 1. Pavement Marking Contractor shall verify compatibility with sealers, joint sealants, caulking and all other surface treatments as specified in Division 07.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Provide product data as follows:
 - 1. Manufacturer's certification that the material complies with standards referenced within this Section.
 - 2. Intended paint use.
 - 3. Pigment type and content.
 - 4. Vehicle type and content.
- C. Submit list of similar projects (minimum of 5) where pavement-marking paint has been in use for a period of not less than 2 yrs.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.4 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 degrees F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.

1.5 QUALITY ASSURANCE

- A. Provide written 1 year warranty to Owner that pavement markings will be free of defects due to workmanship, inadequate surface preparation, and materials including, but not limited to, fading and/or loss of markings due to abrasion, peeling, bubbling and/or delamination. Excessive delamination, peeling, bubbling or abrasion loss shall be defined as more than 15% loss of marking material within one year of substantial completion and/or occupancy of the parking area. With no additional cost to Owner, repair and/or recoat all pavement marking where defects develop or appear during warranty period and all damage to other Work due to such defects.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pavement marking materials shall meet Federal, State and Local environmental standards.
- B. Paint shall be manufactured and formulated from first grade raw materials and shall be free from defects or imperfections that might adversely affect product serviceability.
- C. Paints shall comply with the National Organic Compound Emission Standards for Architectural Coatings, Environmental Protection Agency, 40 CFR Part 59.
- D. The product shall not contain mercury, lead, hexavalent chromium, or halogenated solvents.

2.2 PAVEMENT MARKING PAINTS:

- A. 100% acrylic waterborne - paint shall be used for white and yellow pavement markings and shall meet requirements of MPI #70.
 - 1. All products shall have performance requirements of Type I and II of Federal Standard TT-P-1952E.
 - 2. 100% acrylic waterborne paint for special color pavement markings (blue, green, red, black) shall meet requirements of Federal Specification TT-P-1952E. Special color marking materials shall be compatible with the white and yellow pavement markings where they are layered.

2.3 COLOR OF PAINT

- A. Color of paint, unless noted otherwise on Contract Drawings, shall be yellow and shall match federal color chip No. 33538. Color shall have daylight directional reflectance (without glass beads) of not less than 50% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- B. Paint color for traffic yellow, where shown on Contract Drawings or specified herein, shall match federal color chip No. 33538 commonly referred to as federal highway yellow. Color shall have daylight directional reflectance (without glass beads) of not less than 50% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- C. Paint color for blue accessible parking space pavement markings, if shown on Contract Drawings, shall match federal color chip No. 35180. Color shall have daylight directional reflectance (without glass beads) of not less than 52% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.
- D. Paint color for green special-use parking space pavement markings, if shown on Contract Drawings, shall match federal color chip No. 34108. Color shall have daylight directional reflectance (without glass beads) of not less than 52% (relative to

magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.

- E. Paint color for red special-use parking space pavement markings, if shown on Contract Drawings, shall match federal color chip No. 31136. Color shall have daylight directional reflectance (without glass beads) of not less than 52% (relative to magnesium oxide) when tested in accordance with Federal Test Method Standard 141, Method 6121.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- D. Striping shall not be placed until full cure of concrete slab and sealer. Concrete surfaces generally require 30 to 90 days @ 70°F or higher. Sealers (other than silane) generally require 14 days @ 70°F or higher. Silane sealers require 24 hrs @ 70°F or higher. Bituminous surfaces generally require 30 days @ 45° F or higher.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. All existing striping to be removed from the floor slabs of the Lower Locks Parking Garage.
- C. Do not paint or finish any surface that is wet or damp.
- D. Clean substrates of substances that could impair bond of paints, including dirt, dust, oil, grease, and incompatible paints and encapsulants.

- E. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- F. Lay out all striping on each tier, using dimensions and details shown on Contract Drawings, before painting that tier. Report any discrepancies, interferences or changes in striping due to field conditions to Engineer/Architect prior to painting. Pavement Marking Contractor shall be required to remove paint, repair surface treatment and repaint stripes not applied in strict accordance with Contract Drawings.
- G. Where existing painted pavement markings and/or stripes conflict with new striping layout or must be removed due to installation which does not conform to contract requirements, remove existing paint markings, using care to avoid scarring substrate surface.
 - 1. Concrete and asphalt surfaces: Material shall be removed by methods acceptable to Engineer/Architect and cause as little damage as possible to surface texture of pavement. Methods, that can provide acceptable results, are grinding and air or shot blasting. Use of chemicals to remove pavement markings prohibited. Collect residue generated by removal of pavement markings and dispose of as required by all applicable laws and regulations. If grinding is used, lightly grind floor surface using wheel mounted floor grinder or similar equipment with positive elevation control of grinder head. For all removal techniques: On test area, demonstrate to Owner acceptable removal of paint material and control of paint removal equipment to prevent substrate scarring.
 - 2. Traffic Topping/Membrane surfaces: Remove existing pavement markings by solvent washing or high-pressure water washing. Submit letter from traffic topping/membrane manufacturer certifying that solvents and/or water pressures are acceptable for this use and will not damage material. On test area, demonstrate to Owner acceptable removal of paint material and control of paint removal equipment to prevent substrate scarring.
 - 3. Contractor shall not use paint, bituminous bond coat or other methods of covering markings to obliterate existing pavement markings.
 - 4. Material deposited on pavement as a result of removal shall be removed as work progresses. Accumulation of material, that might interfere with drainage or might constitute a hazard to traffic, prohibited.
 - 5. Curing compounds on new concrete surfaces (less than 1 yr old) shall be removed per existing pavement marking removal requirements prior to installation of new pavement markings.
- H. Work Areas:
 - 1. Store, mix and prepare paints only in areas designated by Contractor for that purpose.
 - 2. Provide clean cans and buckets required for mixing paints and for receiving rags and other waste materials associated with painting. Clean buckets regularly. At close of each day's Work, remove used rags and other waste materials associated with painting.
 - 3. Take precautions to prevent fire in or around painting materials. Provide and maintain appropriate hand fire extinguisher near paint storage and mixing area.

- I. Mixing:
 - 1. Do not intermix materials of different character or different manufacturer.
 - 2. Do not thin material except as recommended by manufacturer.
- J. Disposal:
 - 1. Contractor shall properly dispose of unused materials and containers in compliance with Federal Resource Conservation Recovery Act (RCRA) of 1976 as amended, and all other applicable laws and regulations.

3.3 APPLICATION

- A. Apply paint in 2-coat system; first coat shall be 50% of total 15 wet mil minimum thickness, not to exceed 8 mils. First coat shall be cured prior to installation of second coat. At Contractor's option, one coat may be applied before substantial completion, with a second coat delayed for 3-6 months until weather conditions are appropriate and the concrete has cured sufficiently for proper adhesion.
 - 1. Two coat system total wet mil thickness of 0.015 in (0.381 mm).
 - 2. Two coat system total wet mil thickness of 0.018 to 0.025 in (0.457 – 0.635 mm) When Type IVA beads are used.
 - 3. Two coat system total wet mil thickness of 0.015 to 0.018 in (0.381 – 0.457 mm) When Type IVB beads are used.
- B. Uniformly apply thermoplastic markings at a thickness of 0.125 to 0.188 inches.
 - 1. If applying to pavements that are less than one year old, ensure that both the pavement surface and the ambient air temperature at the time of application are not less than 50° F (10° C) and not more than 440° F (277 °C) unless otherwise accepted by manufacturer.
- C. Apply painting and finishing materials in accordance with manufacturer's directions. Use applications and techniques best suited for material and surfaces to which applied. Minimum air shall be used to prevent overspray. Temperature during application shall be minimum of 40° F and rising, unless manufacturer requires higher minimum temperature. Maximum relative humidity shall be as required by manufacturer.
- D. Application of beads and/or silica sand shall coincide with application of paint, but shall be done as separate operation by a suitable dispenser. Sand may be premixed with paint for application to curbs only. Glass beads and silica sand shall adhere to the cured paint or all marking operations shall cease until corrections are made.
- E. All lines shall be straight, true, and sharp without fuzzy edges, overspray or non-uniform application. Corners shall be at right angles, unless shown otherwise, with no overlaps. Line width shall be uniform (-0%, +5% from specified width). No excessive humping (more material in middle than at edges or vice versa).

3.4 APPLICATION OF TEMPORARY PAVEMENT MARKING

- A. Temporary pavement markings shall be preformed tape, conforming to ASTM D4592, type 1, removable.
- B. Temporary pavement markings shall be applied after paving, but before being opened to traffic and parking. Markings that are improperly applied and come loose shall be replaced at Contractor's expense, as directed by Engineer/Architect.
- C. Temporary pavement markings on finished pavement surface shall be installed allowing for lateral tolerance of ± 2 in. center to center. Temporary pavement markings that are installed outside specified lateral tolerances shall be removed and replaced, as directed by Engineer/Architect, at Contractor's expense.
- D. All marking shall have width of 4 in. unless otherwise specified. Markings shall be either white or yellow per Contract Drawings.
- E. Apply and remove preformed tape per manufacturer's instructions.
- F. Remove all temporary pavement markings prior to placing permanent pavement markings.

END OF SECTION 099120

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SECTION 210500 – COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. Following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 01:
 - 1. Submittals.
 - 2. Coordination/Scheduling/Quality Assurance.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Mechanical installations.
 - 7. Cutting and patching.
 - 8. Testing/Guarantee
- B. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 21, plus general related specifications including:
 - a. Access to mechanical installations.
 - b. Excavation for mechanical installations within the building boundaries, and from building to utilities connections.
- C. Definitions:
 - 1. Term "Contractor" used throughout Division 21 shall mean Mechanical Subcontractor.
 - 2. Term "provide" shall mean to furnish all necessary labor, materials, equipment, accessories, transportation, services, installation and adjustment under Contract amount, including Contractor's profit, overhead and payment of all taxes and fees.

1.3 SUBMITTALS

- A. General: Follow the procedures specified in Division 01 Section "Submittal Procedures" and as specified in this Section.
- B. Shop Drawings and Catalog Sheets. Include:
 - 1. Back flow preventers.
 - 2. Standpipe fire line layout and components.
 - 3. PIV Valves.
 - 4. Support material and hardware.
- C. Substitutions:
 - 1. Products are referenced in Specification and on Drawings to establish standard of quality, style, design, and function of materials, equipment, apparatus, or product.
 - 2. There are often several satisfactory substitutes for standardized utilitarian items which satisfy design objectives.
 - 3. Since it is impractical to name all possible brands that might be furnished, substitutes may be proposed unless specifically stated otherwise.
 - 4. Submit substitutions in accordance with Division 01 and General Conditions of Specification and as follows:
 - a. Submit proposed substitute material or equipment to be considered for approval as equivalent to Engineer/Architect at least 7 days before time set for receiving Bids.
 - b. Contractor assumes all engineering and construction costs necessary for revision in Work due to substitute material or equipment.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.4 COORDINATION/SCHEDULING/CODES AND STANDARDS

- A. Coordination:
 - 1. Visit site before Bidding to note apparent features which may affect Work. No subsequent allowance will be made because of failure to make this examination before Bidding.
 - 2. Verify all dimensions in field before ordering any material or doing any Work.
 - 3. Verify ceiling heights or other architectural and structural details before installing any piping.
 - 4. No extra compensation will be allowed because of differences between actual measurements and dimensions and those indicated on Drawings.
 - 5. Notify Engineer/Architect in writing of any difference which may be found before proceeding with Work.

B. Scheduling:

1. Schedule Work so as to coordinate with other Contractors.
2. Before starting Work, prepare and submit to Prime Contractor schedule of operations outlining proposed order of procedure, giving dates of execution and estimated time required for completion of each step.
3. After schedule has been accepted by Prime Contractor and Engineer/Architect, do not deviate from schedule without written consent of Prime Contractor.
4. No subsequent extras will be allowed for materials and labor not included by Bidder for Mechanical Work due to lack of familiarity with Contract Documents as they relate to Work of all other trades required for Project.
5. Before construction starts, cut off and plug any abandoned existing services at property line. Coordinate with local utility company and civil engineer.
6. Coordinate service connection to meter with local water department and civil engineer.

C. Codes and Standards:

1. Comply with:
 - a. American Welding Society (AWS).
 - b. American Society of Mechanical Engineers (ASME).
 - c. American National Standards Institute (ANSI).
 - d. American Society for Testing and Materials (ASTM).
 - e. American Insurance Association (A.I.A.).
 - f. National Fire Protection Association (NFPA).
 - g. Underwriters' Laboratories, Inc. (UL).
 - h. Manufacturer's Standardization Society of the Valve & Fittings Industry, Inc. (MSS).
 - i. Factory Mutual Research Corp. (FM).
 - j. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - k. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
2. All local, state, and federal rules and regulations.
 - a. International Building Code (IBC):
 - 1) IBC International Building Code.
 - 2) IBC International Mechanical Code.
 - 3) IBC International Plumbing Code.
 - 4) IBC International Fire Prevention Code.
3. Should any change in Drawings and Specifications be required to comply with local regulations, notify Engineer/Architect at least 7 days before time set for receiving Bids. After entering into contract, Contractor will be held to complete all Work necessary to meet local requirements without extra expense to Owner.
4. Maintain a competent superintendent at Project throughout progress of Work and until Work is completed.

1.5 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 01 Section "Closeout Procedures". In addition to the requirements specified in Division 01, indicate the following installed conditions:
 - 1. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
 - 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 - 3. Approved substitutions, contract modifications, and actual equipment and materials installed.
 - 4. Contract modifications, actual equipment and materials installed.
- B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified in Division 01 Section "Execution Requirements" to record the locations and invert elevations of underground installations.

1.6 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 01 Section "Closeout Procedures". In addition to the requirements specified in Division 01, include the following information for equipment items:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 - 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 - 4. Servicing instructions and lubrication charts and schedules.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Deliver materials to Project in good condition. Store materials off ground and protected from elements.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 02 through 33 for rough-in requirements.
- C. Drawings are generally diagrammatic and indicative of Work to be installed.
- D. Do not scale Drawings for rough-in Work.

3.2 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate mechanical systems, equipment, and materials installation with other building components so as not to delay Contractors.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 8. Install systems, materials, and equipment to conform with approved submittal data to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer/Architect.
 - 9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
 - 10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect

- equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
11. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Panels".
 12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
 13. Install piping to occupy minimum of space. Install parallel and close to walls, ceiling, columns or other members providing proper space for covering or removal of pipes.
 14. Coordinate Work to avoid interferences with other trades.
 15. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings or valves which may be required. Investigate structural and finish conditions affecting this Work. Plan accordingly, furnishing such offsets, fittings and valves as may be required.
 16. Where possible, locate all plumbing lines in areas which are out of public view.
 17. Review plumbing layout with Engineer/Architect before construction.
 18. In case of conflict between riser diagram and floor plan, greater quantity or better quality prevails, subject to approval of Engineer/Architect.
 19. Coordinate all Work specified in this Division with Work of all other trades required for Project.
 20. Check Structural Drawings for location of drains, vents and other Mechanical Work. In case of conflict between Structural Drawings and Mechanical Drawings, Structural Drawings take precedence.
 21. Notify Engineer/Architect immediately and confirm in writing of any conflict between Mechanical and Structural Drawings.
 22. Finish painting will be done by others.
 23. Any galvanized equipment, material, or hardware that is cut, scratched, field threaded or grooved shall be coated with a Zinc Rich Coating (ZRC or approved equivalent).
 24. Trench and backfill in accordance with Division 02 Section "Earthwork."
 25. In case interferences between Work develop, Engineer/Architect will decide which Work is to be relocated regardless of which was first installed.
 26. Cleanup:
 - a. At completion of Work under this contract, remove from site and dispose of all rubbish and discarded materials and restore disturbed facilities and surfaces.
 - b. Provide entire installation thoroughly free from all oil and grease after successfully completing all tests and before Work is turned over to Owner.

3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 01 Section "Cutting and Patching". In addition to the requirements specified in Division 01, the following requirements apply:
 1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

2. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 - a. Uncover Work to provide for installation of improperly scheduled Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in structures.
 - f. Upon written instructions from the Engineer/Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- B. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, and trim, and other mechanical items made obsolete by the new Work.
 1. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
 2. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 3. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 - a. Refer to Division 01 Section "Reference Standards and Definitions" for definition of "experienced Installer".
 4. Respective trades will provide openings in floors, walls, and other members as required for installation of piping and equipment, provided that necessary information regarding such openings is furnished by contractor in timely manner.
 5. If contractor fails to provide information regarding required openings, cutting and repairing of completed Work will be performed by respective trades at expense of contractor.
 6. Seal all such openings in accordance with Division 07 Section "Joint Sealants."

3.4 TESTING AND GUARANTEE

- A. Testing:
 1. Take out all necessary permits, arrange for all required inspections, and pay all fees and expenses associated with performing Mechanical Work.
 2. Test all piping systems at full operating pressure under normal conditions of use in accordance with requirements of Water Department, Board of Health, Fire Department, and all other authorities having jurisdiction. As a minimum, the water supply system shall be tested at 125 psi for 4 hrs, the sewer system at 5 psi for 15 minutes, natural gas at 100 psi for 2 hours, and the standpipe system at 225 psi for 2 hrs.
 3. Provide all instruments for making tests.

4. Perform tests on following systems:
 - a. Water Supply System.
 - b. Sewer System.
 - c. Natural Gas Supply System.
 - d. Standpipe System.
5. Test all parts of system in presence of Contractor, Engineer/Architect, Owner and Authority having jurisdiction for sufficient period of time to permit complete examination and inspection.
6. Successfully test all concealed piping before its being permanently covered up.
7. Remedy all defects in materials or workmanship which appear during test or retest of system.

B. Guarantee:

1. In addition to any specific guarantee called for by Specifications, furnish to Owner written guarantee against defects in materials, workmanship for all apparatus and materials furnished, and for entire workmanship of installation for period of 1 yr from date of acceptance of Work.
2. During guarantee period and without expense to Owner, repair all defects in workmanship or material provided under this Section.

END OF SECTION 210500

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SECTION 220500 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this and other Sections of Division 22.
- B. References:
 - 1. American National Standards Institute (ANSI):
 - 2. National Standard Plumbing Code (NAPHCC):
 - 3. American Society for Testing and Materials (ASTM):
 - a. ASTM A74, "Specification for Cast Iron Soil Pipe and Fittings".
 - b. ASTM A120, "Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Use".
 - c. ASTM A234, "Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures".
 - d. ASTM B88, "Specification for Seamless Copper Water Tube".
 - e. ASTM C76, "Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe".
 - f. ASTM C700, "Specification for Extra Strength and Standard Strength Clay Pipe and Perforated Clay Pipe".
 - g. ASTM D3034, "Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings".

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for mechanical installations. Following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 01:
 - 1. Submittals.
 - 2. Coordination/Scheduling/Quality Assurance.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Mechanical installations.
 - 7. Cutting and patching.
 - 8. Testing/Guarantee
 - 9. Piping materials and installation common to most piping systems.
 - 10. Fittings and Joints.
 - 11. Floor and Trench Drains

12. Back water valves.
13. Cleanouts.
14. Expansion joints for Rain Water Collectors.
15. Valves.
16. Labeling & Identifying.
17. Touch up painting and finishing.
18. Cutting and patching.

B. Related Sections: Following Sections contain requirements that relate to this Section:

1. The remainder of Division 22, plus general related specifications.

C. Definitions:

1. Term "Contractor" used throughout Division 22 shall mean Mechanical Subcontractor.
2. Term "provide" shall mean to furnish all necessary labor, materials, equipment, accessories, transportation, services, installation and adjustment under Contract amount, including Contractor's profit, overhead and payment of all taxes and fees.

1.3 SUBMITTALS

A. General: Follow the procedures specified in Division 01 Section "Submittal Procedures" and as specified in this Section.

B. Shop Drawings and Catalog Sheets. Include:

1. Floor drains.
2. Cleanouts.
3. Expansion joints for plumbing lines.
4. Back flow preventers.
5. Standpipe fire line layout and components.
6. PIV Valves.
7. Support material and hardware.

C. Substitutions:

1. Products are referenced in Specification and on Drawings to establish standard of quality, style, design, and function of materials, equipment, apparatus, or product.
2. There are often several satisfactory substitutes for standardized utilitarian items which satisfy design objectives.
3. Since it is impractical to name all possible brands that might be furnished, substitutes may be proposed unless specifically stated otherwise.
4. Submit substitutions in accordance with Division 01 and General Conditions of Specification and as follows:

- a. Submit proposed substitute material or equipment to be considered for approval as equivalent to Engineer/Architect at least 7 days before time set for receiving Bids.
 - b. Contractor assumes all engineering and construction costs necessary for revision in Work due to substitute material or equipment.
- D. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- E. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.4 COORDINATION

- 1. Visit site before Bidding to note apparent features which may affect Work. No subsequent allowance will be made because of failure to make this examination before Bidding.
- 2. Verify all dimensions in field before ordering any material or doing any Work.
- 3. Verify ceiling heights or other architectural and structural details before installing any piping.
- 4. No extra compensation will be allowed because of differences between actual measurements and dimensions and those indicated on Drawings.
- 5. Notify Engineer/Architect in writing of any difference which may be found before proceeding with Work.

1.5 SEQUENCING AND SCHEDULING

- 1. Coordinate mechanical equipment installation with other building components.
- 2. Arrange for chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- 3. Coordinate the installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- 4. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Coordinate installation of large equipment requiring positioning prior to closing in the building.
- 5. Coordinate connection of electrical services.
- 6. Schedule Work so as to coordinate with other Contractors.
- 7. Before starting Work, prepare and submit to Owner and Engineer/Architect schedule of operations outlining proposed order of procedure, giving dates of execution and estimated time required for completion of each step.
- 8. After schedule has been accepted by Owner and Engineer/Architect, do not deviate from schedule without written consent of Owner.
- 9. No subsequent extras will be allowed for materials and labor not included by Bidder for Mechanical Work due to lack of familiarity with Contract Documents as they relate to Work of all other trades required for Project.

1.6 QUALITY ASSURANCE

- A. Qualify welding processes and operators for structural steel according to AWS D1.1 "Structural Welding Code--Steel".
- B. Qualify welding processes and operators for piping according to ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualifications".
 - 1. Comply with provisions of ASME B31 Series "Code for Pressure Piping".
 - 2. Certify that each welder has passed AWS qualification tests for the welding processes involved and that certification is current.
- C. ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- D. Equipment Selection: Equipment of greater or larger power, dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. No additional costs will be approved for these increases, if larger equipment is approved. If minimum energy ratings or efficiencies of the equipment are specified, the equipment must meet the design requirements and commissioning requirements.

1.7 CODES AND STANDARDS

- 1. Comply with:
 - a. American Welding Society (AWS).
 - b. American Society of Mechanical Engineers (ASME).
 - c. American National Standards Institute (ANSI).
 - d. American Society for Testing and Materials (ASTM).
 - e. American Insurance Association (A.I.A.).
 - f. National Fire Protection Association (NFPA).
 - g. Underwriters' Laboratories, Inc. (UL).
 - h. Manufacturer's Standardization Society of the Valve & Fittings Industry, Inc. (MSS).
 - i. Factory Mutual Research Corp. (FM).
 - j. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
 - k. American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- 2. All local, state, and federal rules and regulations.
 - a. International Building Code (IBC):
 - 1) IBC International Existing Building Code.
 - 2) IBC International Mechanical Code.
 - 3) IBC International Plumbing Code.

- 4) IBC International Fire Prevention Code.
3. Should any change in Drawings and Specifications be required to comply with local regulations, notify Engineer/Architect at least 7 days before time set for receiving Bids. After entering into contract, Contractor will be held to complete all Work necessary to meet local requirements without extra expense to Owner.
4. Maintain a competent superintendent at Project throughout progress of Work and until Work is completed.

1.8 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 01 Section "Closeout Procedures". In addition to the requirements specified in Division 01, indicate the following installed conditions:
 1. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 3. Approved substitutions, contract modifications, and actual equipment and materials installed.
 4. Contract modifications, actual equipment and materials installed.

1.9 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 01 Section "Closeout Procedures" In addition to the requirements specified in Division 01, include the following information for equipment items:
 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 4. Servicing instructions and lubrication charts and schedules.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Deliver materials to Project in good condition. Store materials off ground and protected from elements.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 02 through 33 for rough-in requirements.
- C. Drawings are generally diagrammatic and indicative of Work to be installed.
- D. Do not scale Drawings for rough-in Work.

3.2 MECHANICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate mechanical systems, equipment, and materials installation with other building components so as not to delay Contractors.
 - 2. Verify all dimensions by field measurements.
 - 3. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 4. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
 - 5. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 6. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
 - 7. Install systems, materials, and equipment to conform with approved submittal data to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Engineer/Architect.

8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
9. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.
10. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
11. Install piping to occupy minimum of space. Install parallel and close to walls, ceiling, columns or other members providing proper space for covering or removal of pipes.
12. Coordinate Work to avoid interferences with other trades.
13. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings or valves which may be required. Investigate structural and finish conditions affecting this Work. Plan accordingly, furnishing such offsets, fittings and valves as may be required.
14. Where possible, locate all plumbing lines in areas which are out of public view.
15. Review plumbing layout with Engineer/Architect before construction.
16. In case of conflict between riser diagram and floor plan, greater quantity or better quality prevails, subject to approval of Engineer/Architect.
17. Coordinate all Work specified in this Division with Work of all other trades required for Project.
18. Check Structural Drawings for location of drains, vents and other Mechanical Work. In case of conflict between Structural Drawings and Mechanical Drawings, Structural Drawings take precedence.
19. Notify Engineer/Architect immediately and confirm in writing of any conflict between Mechanical and Structural Drawings.
20. Finish painting will be done by others.
21. Any galvanized equipment, material, or hardware that is cut, scratched, field threaded or grooved shall be coated with a Zinc Rich Coating (ZRC or approved equivalent).
22. In case interferences between Work develop, Engineer/Architect will decide which Work is to be relocated regardless of which was first installed.
23. Cleanup:
 - a. At completion of Work under this contract, remove from site and dispose of all rubbish and discarded materials and restore disturbed facilities and surfaces.
 - b. Provide entire installation thoroughly free from all oil and grease after successfully completing all tests and before Work is turned over to Owner.

3.3 PIPING SYSTEMS-COMMON REQUIREMENTS

- A. General: Install piping as described below, except where system Sections specify otherwise.
- B. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate general location and arrangement of piping systems. Indicated locations and

arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated.

- C. Install all piping parallel to building walls and column lines at such height for proper drainage and so not to interfere with doorways, stairway or traffic.
- D. Install suspended pipes as close to ceiling as possible and at uniform grade.
- E. Where interferences develop in field, offset or reroute piping as required to clear such interferences. Use proper fittings, no bent pipe is permitted.
- F. Install full-time water lines in areas not subject to freezing within building and below frost line and minimum of 36 in. below grade outside building.
- G. Install water meter and backflow preventor in protected area not subject to freezing.
- H. Use small amount of prepared, pipe thread lubricant on outside threads.
- I. Work pipe into place without springing
- J. Install all piping such that it will drain and vent as shown or required.
- K. Provide uniform grade to all horizontal pipes and provide drains at all low points in water piping system.
- L. Cast-in-Place Insert Installation: Before placement of concrete, furnish, locate and set on forms, cast-in-place inserts which support Mechanical Work.
- M. Furnish hot dipped galvanized steel pipe sleeves extended one inch above finished floor line for all pipe running through floors.
- N. Install piping at indicated slope.
- O. Install components having pressure rating equal to or greater than system operating pressure.
- P. Install piping free of sags and bends and neat in appearance.
- Q. Install couplings according to manufacturer's printed instructions.
- R. Fire Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping sealant material.
- S. Verify final equipment locations for roughing in.
- T. Refer to equipment specifications in other Sections for roughing-in requirements.
- U. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping system Sections.
 - 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS "Soldering Manual", Chapter 22 "The Soldering of Pipe and Tube".
4. Brazed Joints: Construct joints according to AWS "Brazing Manual" in the "Pipe and Tube" Chapter.
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full inside diameter. Join pipe fittings and valves as follows:
 - a. Note the internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads (except where dry seal threading is specified).
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. Damaged Threads: Do not use pipe or pipe fittings having threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

V. All piping routed over finished areas must be insulated.

3.4 EQUIPMENT INSTALLATION--COMMON REQUIREMENTS

- A. Install equipment to provide the maximum possible headroom where mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Engineer/Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, except where otherwise indicated.
- D. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. Connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location. Provide unions to facilitate equipment replacement.
- E. Install equipment giving right-of-way to piping systems installed at a required slope.
- F. Provide 4 inch high concrete housekeeping pad with rounded edges under all floor mounted equipment where clearance allows.
- G. Fasteners and Anchors: Hot dipped galvanized or stainless steel, type, grade, and class as required. Mounting holes for all fasteners must be drilled. The use of powder, gas, or other types of power propelled fasteners is prohibited.

3.5 HANGER AND SUPPORT INSTALLATION:

- A. Support piping in building on standard clevis type (MSS SP-69, No. 1) hangers, with adjustable rods.
- B. Properly support all piping installed on suitable pipe hangers and supports. Permanent hangers, supports, and anchors shall be fabricated from durable materials, hot dipped galvanized or stainless steel, suitable for service conditions in accordance with details on Drawings.
- C. Base required strength of all supporting equipment on combined weight of piping filled with water, plus any insulating covering.
- D. Install hangers for horizontal piping with following minimum rod sizes:

<u>Nominal Pipe Size</u>	<u>Minimum Rod Size</u>
0.75 in. to 2 in. pipe	0.375 in.
2.5 in. to 3.5 in. pipe	0.5 in.
4 in. to 5 in. pipe	0.625 in.
6 in. pipe	0.75 in.
8 in. to 12 in. pipe	0.875 in.

- E. Provide and install anchors in piping system to fix direction of expansion and contraction. Fabricate and assemble anchors to secure desired points of piping in relatively fixed positions. Hangers shall permit line to take up expansion and contraction freely in opposite directions away from anchored point and shall be so arranged as to be structurally suitable for particular location, line, and loading conditions in question.
- F. Use expansion anchors to anchor pipe hanger and supports where inserts have been improperly located, or where necessary to support piping from existing concrete construction. Provide expansion anchors equal to Ackerman-Johnson, Paine, Phillips, Hilti, ITW Ramset/Red Head, or Rawl. Expansion anchor locations must have approval of Engineer/Architect before installation. Coordinate location with structural.
- G. Support parallel pipe lines at same level on approved trapeze or saddle type hangers.
- H. Use steel rods to attach ring or trapeze hangers to building structure. Space hangers at sufficiently close intervals to support piping and its contents, 12 ft on center maximum for threaded pipes.
- I. Support copper piping with copper clevis hangers, or clevis hanger with copper supporting loop.
- J. Provide sheet metal collar at each pipe hanger for insulated pipe with vapor barrier.

- K. Any support hardware or material that is cut, scratched or treaded shall be coated with a zinc rich coating (ZRC or equivalent) at these locations.

3.6 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 01 Section "Cutting and Patching". In addition to the requirements specified in Division 01, the following requirements apply:
 - 1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
 - 2. Perform cutting, fitting, and patching of mechanical equipment and materials required to:
 - a. Uncover Work to provide for installation of improperly scheduled Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in structures.
 - f. Upon written instructions from the Engineer/Architect, uncover and restore Work to provide for Architect/Engineer observation of concealed Work.
- B. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, heating units, and trim, and other mechanical items made obsolete by the new Work.
 - 1. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
 - 2. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 - 3. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 - a. Refer to Division 01 Section "Reference Standards and Definitions" for definition of "experienced Installer".
 - 4. Respective trades will provide openings in floors, walls, and other members as required for installation of piping and equipment, provided that necessary information regarding such openings is furnished by contractor in timely manner.
 - 5. If contractor fails to provide information regarding required openings, cutting and repairing of completed Work will be performed by respective trades at expense of contractor.
 - 6. Seal all such openings in accordance with Division 07 Section "Concrete Joint Sealants."

7. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations only with written approval of Engineer/Architect. Perform cutting by skilled mechanics of the trades involved.
8. Repair cut surfaces to match adjacent surfaces.

3.7 LABELING AND IDENTIFYING

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 1. Stenciled Markers: Complying with ASME A13.1.
 2. Locate pipe markers wherever piping is exposed in finished spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums), and exposed exterior locations as follows:
 - a. Near each valve and control device.
 - b. Near each branch, excluding short take-offs for fixtures and terminal units. Mark each pipe at branch, where flow pattern is not obvious.
 - c. Near locations where pipes pass through walls, floors, ceilings, or enter inaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at a maximum of 50 ft (15m) intervals along each run. Reduce intervals to 25 ft (7.6 m) in congested areas of piping and equipment.
- B. Adjusting: Relocate identifying devices which become visually blocked by work of this Division or other Divisions.

3.8 PAINTING AND FINISHING

- A. Refer to Division 09 Section "Exterior Painting" for field painting requirements.
- B. Damage and Touch Up: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.9 CONCRETE BASES

- A. Construct concrete equipment bases of dimensions indicated, but not less than 4 in. (101 mm) larger than supported unit in both directions. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi (20.70MPa), 28-day compressive strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete Restoration".

3.10 TESTING AND GUARANTEE

A. Testing:

1. Take out all necessary permits, arrange for all required inspections, and pay all fees and expenses associated with performing Mechanical Work.
2. Test all piping systems at full operating pressure under normal conditions of use in accordance with requirements of Water Department, Board of Health, Fire Department, and all other authorities having jurisdiction. As a minimum, the water supply system shall be tested at 125 psi for 4 hrs, the sewer system at 5 psi for 15 minutes, and the standpipe system at 225 psi for 2 hrs.
3. Provide all instruments for making tests.
4. Perform tests on following systems:
 - a. Water Supply System.
 - b. Sewer System.
 - c. Standpipe System.
5. Test all parts of system in presence of Contractor, Engineer/Architect, Owner and Authority having jurisdiction for sufficient period of time to permit complete examination and inspection.
6. Successfully test all concealed piping before its being permanently covered up.
7. Remedy all defects in materials or workmanship which appear during test or retest of system.

B. Guarantee:

1. In addition to any specific guarantee called for by Specifications, furnish to Owner written guarantee against defects in materials, workmanship for all apparatus and materials furnished, and for entire workmanship of installation for period of 1 yr from date of acceptance of Work.
2. During guarantee period and without expense to Owner, repair all defects in workmanship or material provided under this Section.

END OF SECTION 220500

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SECTION 221413 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. In accordance with Contract Documents, furnish all labor equipment, and materials to install domestic water, and storm sewer plumbing facility.
- B. This Section includes plumbing piping systems as indicated on the Drawings. Systems include the following:
 - 1. Drainage and vent systems.
- C. Related Sections: Following Sections contain requirements that relate to this Section:
 - 1. Division 22 Section "Common Work Results for Plumbing".

1.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing piping systems with the following minimum working pressure ratings, except where indicated otherwise:
 - 1. Storm Drainage Systems: 10-ft head of water.

1.4 SUBMITTALS

- A. General: Submit the information specified in the submittals Section of "Basic Mechanical Requirements" in accordance with Conditions of Contract and Division 01 Specifications Section.
- B. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- C. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

PART 2 - PRODUCTS

2.1 GENERAL

- A. See Division 22 Section "Common Work Results for Plumbing" for acceptable products and manufacturers.

2.2 MATERIALS

- A. General:

- 1. Provide new materials of the best grade and quality.

- B. Pipe:

- 1. Drainage:

- a. Cast iron: (Storm drainage 15" and smaller)

- 1) Buried underground inside and to point 5 ft outside building: Service weight bell and spigot type, ASTM A74.
 - 2) Above ground: Cast iron "No Hub", ASTM A888.

- C. Fittings and Joints:

- 1. Nipples: Same material as pipe on which they are used. Avoid use of close nipples if possible.
 - 2. Fittings for cast-iron soil pipe: Correspond to pipe in material, ASTM A74.
 - 3. Joints in buried cast-iron pipe: Approved rubber gaskets.
 - 4. Fittings for copper drainage piping: Cast copper fittings, ASA B16.23. Sweat solder joints with lead-free solder.

- D. Floor and Trench Drains: Heavy duty cast-iron with coated, heavy duty, vandal-proof grate and sediment buckets. Size, connection type and additional options are as specified on Drawings.

- 1. Acceptable Manufacturers:

- a. Josam
 - b. Smith.
 - c. Wade.
 - d. Zurn.
 - e. Ancon.

- E. Backwater Valves: Coated cast iron backwater valve, plastic ball float, elastomer seat, bronze cage and threaded or spigot outlet connection:

- 1. Acceptable Manufacturers:

- a. Josam 1000 Series.
 - b. Smith 7000 Series.

- c. Zurn Z-1099 Series.
- d. Ancon BV 230-R.

F. Cleanouts:

1. In conductor risers: Coated cast iron cleanout tee with hub and spigot connections and coated cast iron plug with internal gasket seal for installation in unfinished areas. Where finished appearance in wall installation is required, use in conjunction with access cover or box:
 - a. Acceptable manufacturers:
 - 1) Josam 58510 Series.
 - 2) Smith 4510 Series.
 - 3) Wade W-8560 Series.
 - 4) Zurn Z-1400 Series.
 - 5) Ancon CO-460.
2. In floors in structure: Coated cast iron, adjustable housing, floor cleanout, spigot or no-hub connection with internal gasketed cleanout plug and adjustable housing with heavy duty, secured (vandalproof) scoriated round cast iron tractor cover for heavy traffic for installation flush with finished floor:
 - a. Acceptable manufacturers:
 - 1) Josam 56060 Series.
 - 2) Smith 4240 Series.
 - 3) Wade W-6000-Z and W-7000-Z Series.
 - 4) Zurn Z-1420-25.
 - 5) Ancon C-200-RX.
3. In floors and walls in finished areas: Provide with flush brass ring and covers, chrome plates, screwed to plug and set level and flush with floor or wall.

G. Expansion Joints for Rain Water Collectors: Vertical expansion joint, coated cast iron body and packing gland and siliconed bronze sleeve with preformed neoprene packing gasket:

1. Acceptable manufacturers:
 - a. Josam 26200 Series.
 - b. Smith 1710 Series.
 - c. Wade W-3900 Series.
 - d. Zurn Z-190.

H. Clamps, rods and all support material and hardware shall be hot dipped galvanized or stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Sewer Systems:

1. Provide piping, floor drains and accessories, backwater valve, catch basins, manholes, covers, pumps, or any other required components complete to existing storm, sanitary or combined sewer on site.
2. Pitch all horizontal lines 0.125 in. per ft minimum.
3. Install backwater valves wherever shown on Drawings.
4. All cast-iron pipe buried in ground shall have firm bearing along entire length of undisturbed earth, or on compacted sand. Pipe on fill or loose soil shall be supported on brick or concrete piers, and then firmly embedded in earth. At foot of each stack, block concrete foundation shall be provided for stack, block concrete foundation shall be provided for stack to rest on.
5. Waste piping passing through foundation wall or under footing shall be provided with iron pipe sleeve built into masonry or concrete. Sleeve shall be 2 pipe sizes greater than pipe passing through.
6. Provide and set cleanouts for all drains inside building at ends of all horizontal branches, at base of all stacks, and all points where so indicated, called for, or necessary to clear line of obstructions.
7. Provide cast-iron Y-branch with cleanout at side in locations where cleanout will not be readily accessible due to interference of wall or other member.
8. Provide plugs for cleanouts.
9. Provide Owner with wrench to use for countersunk nuts on cleanout plugs.
10. Vent piping from main sanitary waste and fixture vents shall be extended as shown, 1 ft 9 in. above roof and flashed. Flashing to have 18 in. x 18 in. 4-pound lead base and extended up to top of stack and turned down to stack.

3.2 COMMISSIONING

A. Preparation: Perform following checks before start-up:

1. Systems tests are complete.
2. Damaged and defective specialties and accessories have been replaced or repaired.
3. There is clear space for servicing of specialties.

B. Before operating systems, perform these steps:

1. Close drain valves, hydrants, and hose bibbs.
2. Open valves to full open position.
3. Remove and clean strainers.
4. Verify drainage and vent piping are clear of obstructions. Flush with water until clear.

C. Test and certify systems in accordance with Division 22 Section "Common Work Results for Plumbing".

3.3 ADJUSTING

- A. Adjust operation and correct deficiencies discovered during commissioning.

3.4 DEMONSTRATION

- A. Train Owner's maintenance personnel on procedures related to startup and servicing of interceptors.

3.5 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- B. Place plugs in ends of uncompleted piping at end of day or when work stops.

END OF SECTION 221413

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SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this and the other Sections of Division 26.
- B. References.
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM A123, "Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products".
 - 2. ANSI/NFPA 70:
 - a. "National Electrical Code (NEC)", latest edition.
 - 3. National Fire Protection Association (NFPA).
 - 4. Federal Specification (FS).
 - 5. ANSI/IEEE C.2:
 - a. "National Electrical Safety Code (NESC)", latest edition.
 - 6. Underwriters' Laboratories, Inc. (UL).
 - 7. Insulated Cable Engineers Association, Inc. (ICEA).
 - 8. National Electrical Manufacturers Association (NEMA).

1.2 SUMMARY

- A. This Section includes limited scope general construction materials and methods for application with electrical installations as follows:
 - 1. Submittals.
 - 2. Coordination/Scheduling/Temporary Power/Quality Assurance
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Electrical installations.
 - 7. Cutting and patching.
 - 8. Testing/Demonstration/Guarantee
 - 9. Conduit.
 - 10. Conductors (under 600V).

11. Wiring Devices.
12. Electrical Boxes & Fittings.
13. Equipment Supports Sleeves and Guards.
14. Miscellaneous Metals.
15. Joint Sealers.

B. Related Sections: Following Sections contain requirements that relate to this Section:

1. The remainder of Division 26, plus general related specifications.

1.3 DEFINITIONS

A. Hazardous Areas:

1. Open parking structures used for parking and storage are not classified as hazardous by National Electrical Code, ANSI/NFPA 70, Article 511.
2. Term "Contractor" used throughout Division 26 shall mean Electrical Subcontractor.
3. Term "provide" shall mean to furnish all necessary labor, materials, equipment, accessories, transportation, services, installation and adjustment under Contract amount, including Contractor's profit, overhead and payment of all taxes and fees.

1.4 SUBMITTALS

- A. General: Submit the information specified in accordance with Conditions of Contract and Division 01 Specification Sections.
- B. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.
- C. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.
- D. General: Follow procedures specified in Division 01 Section "Submittal Procedures" and as specified in this Section.
- E. Shop Drawings. Include:
1. Power and distribution panels.
 2. Lighting panels.
 3. Disconnect switches.
 4. Motor starters.
 5. Lighting control panel.
- F. Catalog sheets with notation of proposed materials. Include:
1. Wire and cable.

2. Conduit, fittings and supports.
3. Controls.
4. Boxes.
5. Contactors.
6. Relays.

G. Substitutions

1. Products are referenced in Specification and Drawings to establish standard of quality, style, design, and function of materials, equipment, apparatus, or product.
2. There are often several satisfactory substitutes for standardized utilitarian items which satisfy design objectives.
3. Since it is impractical to name all possible brands that might be furnished, substitutes may be proposed unless specifically stated otherwise.
4. Submit substitutions in accordance with Division 01 and General Conditions of Specification and as follows:
 - a. Submit proposed substitute material or equipment to be considered for approval as equivalent to Engineer/Architect at least 7 days before time set for receiving Bids.
 - b. Contractor shall assume all costs for engineering studies required to evaluate substitute material or equipment.
 - c. Contractor assumes all engineering and construction costs necessary for revision in Work due to substitute material or equipment.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer for the installation and application joint sealers, access panels, and doors.
- B. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel".
 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.6 PROJECT CONDITIONS

- A. Conditions Affecting Selective Demolition: Following project conditions apply:
 1. Locate, identify, and protect electrical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

1.7 COORDINATION/SCHEDULING/TEMPORARY POWER/CODES AND STANDARDS

A. Coordination

1. Visit site before Bidding to note apparent features which may affect Work. No subsequent allowance will be made because of failure to make examination before Bidding.
2. Check conditions in actual Project against Drawings for all dimensions door swings, ceiling heights or other features affecting electrical Work.
3. Verify all dimensions in field before ordering any material or doing any Work.
4. No extra compensation will be allowed because of differences between actual measurements and dimensions and those indicated on Drawings.
5. Notify Engineer/Architect in writing of any differences which may be found before proceeding with Work.

B. Scheduling

1. Schedule Work so as not to delay other Contractors.
2. Before starting Work, prepare and submit to Owner and Engineer/Architect schedule of operations outlining proposed order of procedure, giving dates of execution and estimated time required for completion of each step.
3. Coordinate shut-off and disconnection of electrical service with the Owner and the utility company.
4. After schedule has been accepted by Owner and Engineer/Architect, do not deviate from schedule without written consent of Owner.
5. No subsequent extras will be allowed for materials and labor not included by Bidder for electrical Work due to lack of familiarity with Contract Documents as they relate to Work of all other trades required for Project.

C. Temporary Power

1. Provide temporary electric service as defined in Division 01 Section "Temporary Facilities and Controls".

D. Codes and Standards:

1. Comply with:
 - a. State electrical administration and local inspection department recognized by state as having jurisdiction.
 - b. Requirements of state and federal Occupational Safety and Health Acts.
 - c. Latest edition of "National Electrical Code", ANSI/NFPA 70.
 - d. Latest edition of "National Electrical Safety Code", ANSI C2.
 - e. Underwriters Laboratories (UL).
 - f. National Electrical Manufacturers' Association (NEMA).
 - g. Institute of Electrical and Electronics Engineers (IEEE).
 - h. Illumination Engineering Society (IES).
 - i. National Fire Protection Association (NFPA).
 - j. International Building Code (IBC):
 - 1) IBC International Existing Building Code.
 - 2) IBC International Mechanical Code.

- 3) IBC International Plumbing Code.
- 4) IBC International Fire Prevention Code.

1.8 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 01 Section "Closeout Procedures".

1.9 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 01 Section "Closeout Procedures". In addition to requirements specified in Division 01, include the following information for equipment items:
 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 4. Servicing instructions and lubrication charts and schedules.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.
- B. Deliver materials to project in good condition. Store materials off ground and protected from elements.
- C. Identify distribution equipment, contactors, control stations, and other devices with permanent, engraved nameplates attached with screws proportional to size of equipment stating name of item and system of which it is part.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide:

1. Materials that are new and listed by Underwriters' Laboratories, Inc., bearing their label.
2. Materials suitable for environment and exposure
3. Weatherproof or raintight outdoor equipment.

B. Conform with:

1. National Electrical Code (ANSI/NFPA 70).
2. All state and local codes.
3. National Electrical Manufacturers Association (NEMA).
4. American National Standards Institute (ANSI).
5. National Fire Protection Association, Inc. (NFPA).
6. Insulated Cable Engineers Association, Inc. (ICEA).
7. Underwriters' Laboratories, Inc. (UL).
8. Institute of Electrical and Electronic Engineers (IEEE).

2.2 CONDUIT

- A. Exposed: Rigid hot-dipped galvanized steel with threaded fittings. (EMT conduit shall not be used in any location.)

1. Acceptable Manufacturers:

- a. Allied Tube & Conduit Corp.
- b. Western Tube & Conduit Corp.
- c. Wheatland Tube Co.

- B. Embedded and Underground: 100% pure, polyvinyl chloride (PVC) rigid, Schedule 40 with cemented couplings in accordance with NEMA TC-6:

1. Acceptable Manufacturers:

- a. Carlon.
- b. Condux International, Inc.
- c. Certainteed Products Corp.
- d. Thomas & Betts.

- C. At building expansion joints provide at exposed conduit runs only:

1. O.Z. Gedney Type AX Expansion Fittings.

2.3 CONDUCTORS (UNDER 600 V)

- A. Use copper wire, sized as indicated on the drawings or per NEC when not indicated with No. 10 AWG being minimum allowable power conductor size. Control wiring shall not be less than No. 12 AWG unless otherwise indicated on Drawings.

- B. No. 10 AWG and No. 12 AWG; provide solid wire, No. 8 AWG and larger; provide stranded wire.
- C. Conductor Insulation: THWN
- D. Conductors in fluorescent fixture channels: "THHN"
- E. Insulation types of better quality or ratings may be used with Engineer/Architect's approval.
- F. Include green colored grounding conductors, sized as indicated on Drawings or per NEC 250 when not indicated, but no smaller than #10, in conduits to provide electrical grounding continuity to all boxes, devices, and outlets.
- G. Color code secondary service, feeder, and branch circuit conductors with factory applied color as follows:

<u>208Y/120 Volts</u>	<u>Phase</u>	<u>480Y/277Volts</u>
Black	A	Brown
Red	B	Orange
Blue	C	Yellow
White	Neutral	Natural Gray
Green	Ground	Green

Phasing at terminals shall be A-B-C, from front to back, top to bottom, or left to right as viewed from the front.

- H. The phase rotation of all normal power, generator power, and UPS systems must be aligned. Reduced size neutral conductors are not permitted.

2.4 WIRING DEVICES:

- A. Wiring devices shall be specification grade with rugged plastic housing and brown in color.
- B. All receptacles will be Ground Fault Circuit Interruptor (GFCI) Type.
- C. Switches shall be heavy duty, AC quiet type, toggle handle, 20 amp, 120-277 volts, Hubbell No. 1221.
- D. Device plates shall be Hubbell (302/304) brushed stainless steel in enclosed finished areas, hot-dip galvanized steel in enclosed unfinished areas and weather proof type cast metal in other areas or approved equivalents.
- E. Fractional Horsepower Manual Starters with thermal overloads (Square "D" Class 2510 or approved equivalent) shall be used to protect all equipment with fractional horsepower motors not controlled from magnetic starter.

2.5 ELECTRICAL BOXES AND FITTINGS:

- A. Outlet, device, pull and junction boxes, conduit bodies and fittings shall be sized per NEC Article 370. All conduit connections shall be threaded.
- B. Surface boxes and covers: (Aluminum boxes are not acceptable)
 - 1. Weatherproof hot-dip galvanized cast metal or malleable iron with threaded fittings.
 - 2. Weatherproof zinc electroplated cast metal or malleable iron with threaded fittings.
- C. Boxes for other areas and uses: Gasketed screw cover boxes, 14 or 12 gage, G-90 grade galvanized bodies, 12 or 10 gage G-90 grade galvanized steel covers, NEMA 3R GSC with threaded hubs.
- D. Boxes embedded in walls: Concrete type.

2.6 MATERIAL AND EQUIPMENT SUPPORTS, SLEEVES, AND GUARDS:

- A. Provide supports, foundations, stands, platforms, anchor bolts, and other necessary material required to install electrical equipment and systems. When anchor bolts for lighting poles, or other fasteners, are embedded in structure as it is being erected, provide templates and coordinate installation. Anchor bolts and baseplates shall be hot-dip galvanized in accordance with ASTM A153. Bond 1 anchor bolt to structural rebar.
- B. Provide hot-dipped galvanized steel sleeves in walls and floors for passage of exposed conduit. Make sleeves watertight and extend sleeves through floors 6 in. above finished floor. Caulk space between conduit and sleeve.
- C. Provide approved, hot-dipped galvanized steel guards around junction boxes, conduits, and equipment which may be exposed to vehicle damage.

2.7 MISCELLANEOUS METALS

- A. Steel plates, shapes, bars, and bar grating: ASTM A 36.
- B. Cold-Formed Steel Tubing: ASTM A 500.
- C. Hot-Rolled Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, Schedule 40, welded.
- E. Nonshrink, Nonmetallic Grout: Premixed, factory-packages, nonstaining, noncorrosive, nongaseous grout, recommended for interior and exterior applications.

- F. Fasteners and Anchors: Hot dipped galvanized or stainless steel, type, grade, and class as required. Mounting holes for all fasteners must be drilled. The use of powder, gas, or other types of power propelled fasteners is prohibited.

2.8 JOINT SEALERS

- A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application as specified in Division 07 "Concrete Joint Sealants".
- B. Colors: As selected by Engineer/Architect from manufacturer's standard colors.
- C. Fire-Resistant Joint Sealers: Two-part, foamed-in-place, silicone sealant formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire-rated walls and floors. Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with ASTM E 814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide 1 of the following:
 - a. "Dow Corning Fire Stop Foam", Dow Corning Corp.
 - b. "Pensil 851", General Electric Co.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 02 through 33 for rough-in requirements.
- C. Do not scale Drawings for rough-in measurements.

3.3 ELECTRICAL INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:

1. Maintain competent superintendent at site throughout progress of Work until work completed.
2. Use only skilled workers experienced in electrical construction.
3. Coordinate electrical systems, equipment, and materials installation with other building components so as not to delay contractors.
4. Verify all dimensions by field measurements.
5. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
6. Coordinate installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components as they are constructed.
7. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
8. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
9. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
10. Install systems, materials, and equipment to conform with approved submittal data to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to Engineer/Architect.
11. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
12. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
13. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
14. Provide and install or arrange for installation of anchors supports, support frames, light pole anchor bolts, and other items required for installation of materials or equipment specified under this Division.
15. Circuit lines shown on Drawings indicate locations of proposed conduit runs, unless noted otherwise.
16. Circuit numbers are shown at each outlet or are designated on each home run.
17. Conduit runs between outlets and home-run conduits may be arranged or grouped to suit job conditions, but follow circuit patterns as designated on Drawings.
18. Review location of all electrical conduit with Engineer/Architect before construction.
19. Cooperate with others to locate electrical conduit out of public view.
20. In case of conflict between riser diagram and floor plan, greater quantity or better quality prevails, subject to approval of Engineer/Architect.
21. After equipment suppliers are selected and exact power requirements known, Contractor shall verify that all components of power supply system are sized

- properly per NEC and any other governing codes. If any component of power supply system is found to be too small, Contractor shall increase component size to meet codes.
22. In case interferences between Work develop, Engineer/Architect will decide which Work is to be relocated regardless of which was first installed.
 23. Conduit Slots: Where Drawings indicate conduits routed through slots in precast tees, personnel shall be at site during time tees are being erected so that conduits can be passed through slots in full lengths before end panels are installed. Otherwise it may be necessary to use shorter lengths of conduits.
 24. Any galvanized equipment, materials or hardware that is cut, scratched or field threaded, shall be coated with a zinc rich coating (ZRC or approved equivalent) at these locations.
 25. In locations where light fixtures, exit signs, emergency battery packs, remote heads, or other pieces of equipment needs to be mounted over piping or other obstacles, provide extension bracket made out of 1/4" hot dipped galvanized steel plates.
 26. Cleanup: At completion of Work under this contract, remove from building site and dispose of all rubbish and discarded materials and restore disturbed facilities and surfaces.

3.4 CONDUIT INSTALLATION

- A. Conduit shall be sized to provide maximum 40% fill per NEC with 3/4 in. being minimum allowable size. Use large radius sweeps in all bends.
- B. In parking areas and unfinished equipment storage/utility rooms, run conduit under slab on grade or exposed unless otherwise indicated. Coordinate location with Engineer/Architect.
- C. In elevator lobbies, office areas and other finished areas, conceal conduit runs unless otherwise noted on Drawings.
- D. Terminate conduits at all outlets and switches in suitable outlet boxes. Where 2 or more compatible devices are set side by side, set in gang boxes, unless otherwise noted on Drawings.
- E. Coordinate with Engineer/Architect to locate exposed conduit runs. All exposed conduit shall be run square with building except where specifically noted otherwise on Drawings.
- F. Securely fasten exposed conduits to ceiling or walls with 1 hole malleable iron hot-dip galvanized pipe straps and clamp backs at 8 ft on center maximum. Provide nest backs or other spacers or extensions as required to achieve proper mounting heights. Using blockouts or other structural members as a source of support is prohibited.
- G. Close all unused open knockouts.
- H. Provide nylon pull cords in all empty conduits.

- I. Take precautions to prevent water, dirt, concrete, or other material from entering conduit and junction boxes.
- J. Coring and drilling of walls and beams to conceal conduit and risers are responsibility of this Contractor. Verify exact locations of penetrations with Engineer/Architect before coring and drilling. Seal all such openings in accordance with Division 07 "Concrete Joint Sealants".
- K. Use seal tight flexible conduit in lengths not greater than 2 ft to connect motors, transformers, and for whips connecting trunnion mounted fixtures to junction boxes. Do not install flexible conduit at other locations without written approval of Engineer.
- L. Obtain written approval of Engineer/Architect before making significant changes in conduit runs from those indicated on Drawings. Record all changes on set of Drawings furnished by Engineer/Architect. At completion of Work, prepare corrected Record Drawings on transparencies supplied by Engineer/Architect.
- M. Conduits penetrating through fire rated walls and floor slabs shall be sealed against spread of fire and products of combustion with intumescent fire barrier penetration sealing system with fire/smoke rating of floor or wall through which conduits pass.
- N. Conduit containing emergency circuits shall not contain any other type of circuit.
- O. Box covers located less than 8 ft above the floor shall be equipped with tamperproof screws.
- P. All empty conduits shall be labeled at termination points.
- Q. Any conduit that is cut, scratched or threaded shall be coated with a zinc rich coating (ZRC or approved equivalent) at these locations.
- R. All conduit connections must be threaded. All conduit connections to panels, boxes, fixtures and other equipment must be made with gasketed threaded hubs.
- S. Do not route vertical conduit risers through expansion joints.

3.5 CONDUCTOR INSTALLATION:

- A. All conductors shall be run in conduit.
- B. All wire to wire connections shall be made with properly sized wire nuts.
- C. Increase wire sizes on long runs to minimize voltage drop to 3% maximum from panel to most distant outlet.
- D. Do not begin wiring until work which might cause damage to wires or conduit has been completed.

- E. When there are more than 3 current carrying conductors in conduit, apply NEC Ampacity Adjustment Factor, assuming no diversity, and increase conductor sizes as required. (Also comply with any additional local requirements.)
- F. Wiring from emergency source or emergency source distribution over current protection to emergency loads shall be kept entirely independent of all other wiring and equipment and shall not enter same raceway, cable, box, or cabinet with other wiring.
- G. Use Burndy reducer adaptors as required to connect oversized conductors to breakers or other pieces of equipment.

3.6 WIRING DEVICE INSTALLATION:

- A. Locate devices as shown on Drawings.
 - 1. Actual location may vary from these dimensions by enough distance to clear any construction interference or other obstruction.
 - 2. Owner's or Engineer/Architect's request for minor changes in location of switches, outlets, or connections shall not constitute an extra, provided changes are requested before particular outlet or circuit is installed.
- B. Switch Installation:
 - 1. Mount at 4 ft above finished floor. Adjust to fit masonry coursing where dimensions are not critical.
 - 2. Install switches on latch side of door unless otherwise noted.
 - 3. Install 2 or more switches together in standard ganged box.
- C. Convenience Outlet: Mount so that bottom of box is 18 in. above finished floor except in parking areas, mount bottom of box 36 in. above finished floor. Adjust to fit masonry coursing, strand rail and other obstructions as required.
- D. Receptacle plates and switch plates: Install specified device plate on every receptacle and switch shown on Drawings.

3.7 ELECTRICAL BOXES AND FITTINGS INSTALLATION:

- A. Provide box for each device and junction box shown on Drawings.
- B. Close unused openings in all boxes in accordance with NEC.
- C. All boxes and enclosures for emergency circuits shall be marked so they will be readily identified as component of emergency circuit.

3.8 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 01 Section "Cutting and Patching". In addition to the requirements specified in Division 01, the following requirements apply:
1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
 2. Perform cutting, fitting, and patching of electrical equipment and materials required to:
 - a. Uncover Work to provide for installation of improperly scheduled Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. Install equipment and materials in structures.
 - f. Upon written instructions from Engineer/Architect, uncover and restore Work to provide for Engineer/Architect observation of concealed Work.
 3. Cut, remove, and legally dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work.
 4. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
 5. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 6. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 - a. Refer to Division 01 Section "Reference Standards and Definitions" for definition of experienced "Installer".
 7. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 - a. Refer to Division 01 Section "Reference Standards and Definitions" for definition of experienced "Installer".
- B. Seal all openings in accordance with Division 07 Section "Concrete Joint Sealants".

3.9 TESTING/ DEMONSTRATION/GUARANTEE

- A. Testing:
1. Provide installation free from any faults or grounds and in operating condition.
 2. Provide all equipment necessary to make tests.

3. Test all completed electrical systems and components for proper operation.
4. Test motors for proper rotation.
5. If faults or grounds are present, correct problem and retest system.

B. Demonstration:

1. After the Electrical Contractor states that the structure is ready to be checked by the Engineer/Architect for the electrical punchlist, the Electrical Contractor shall arrange for the Electrical superintendent to demonstrate the proper operation of all electrical components and systems to the Engineer/Architect. If it is discovered that any component or system does not operate properly the Electrical Contractor must pay all costs associated with return trips required to verify proper operation by the Engineer/Architect.

C. Guarantee:

1. Leave entire electrical system in proper working order.
2. Provide Owner guarantee that all material, equipment and wiring furnished and installed are free from all electrical and mechanical defects for 1-yr period from date of acceptance of work.
3. Make good any defects which become apparent within that 1-yr guarantee period without expense to Owner.
4. Provide Owner with any other guarantees extended by manufacturers of equipment furnished and installed in Project.

END OF SECTION 260500

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SECTION 321216 - ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Hot-mix asphalt patching.
 - 2. Hot-mix asphalt paving.
- B. Related Sections:
 - 1. Division 9 Section "Pavement Marking."

1.3 DEFINITION

- A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - 1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Qualification Data: For qualified manufacturer and installer.
- D. Material Certificates: For each paving material, from manufacturer.
- E. Material Test Reports: For each paving material.
- F. See requirements of Division 01 Section, "Submittal Procedures," Part 1 heading, "Submittal Procedures," for limits to resubmittals.

- G. See requirements of Division 01 Section, "Submittal Procedures," Part 2 heading, "Requests for Information," for RFI constraints.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the Massachusetts DOT.
- B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the State Of Massachusetts DOT for asphalt paving work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Prime Coat: Minimum surface temperature of 80 deg F
 - 2. Tack Coat: Minimum surface temperature of 60 deg F .
 - 3. Slurry Coat: Comply with weather limitations in ASTM D 3910.
 - 4. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 5. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel.
- C. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
 - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
- D. Mineral Filler: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, Massachusetts DOT.
- B. Prime Coat: ASTM D 2027, medium-curing cutback asphalt, MC 30.
- C. Prime Coat: Asphalt emulsion prime coat complying with Massachusetts DOT requirements.
- D. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- E. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Sand: ASTM D 1073 or AASHTO M 29, Grade Nos. 2 or 3.
- B. Joint Sealant: ASTM D 6690, Type II, hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Base Course
 - 3. Surface Course: .

- B. Emulsified-Asphalt Slurry: ASTM D 3910, Type 1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - 1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction] Limit vehicle speed to 3 mph.
 - 2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.
- C. Proceed with paving only after unsatisfactory conditions have been corrected.
- D. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

3.2 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd. .
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.3 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch (25 mm) in existing pavements.
 - 1. Install leveling wedges in compacted lifts not exceeding 3 inches (75 mm) thick.
- B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch .
 - 1. Clean cracks and joints in existing hot-mix asphalt pavement.
 - 2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
 - 3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at minimum temperature of 250 deg F.
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet (wide unless infill edge strips of a lesser width are required).
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 4. Compact asphalt at joints to a density within 2 percent of specified course density.

3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927, but not less than 94 percent nor greater than 100 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: [1/4 inch
 - 2. Surface Course: [1/8 inch.
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer/Architect.
- B. Allow paving to age for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.

2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - a. One core sample will be taken for every 100 sq. yd. or less of installed pavement, with no fewer than 3 cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 1. Do not allow milled materials to accumulate on-site.

END OF SECTION 321216

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